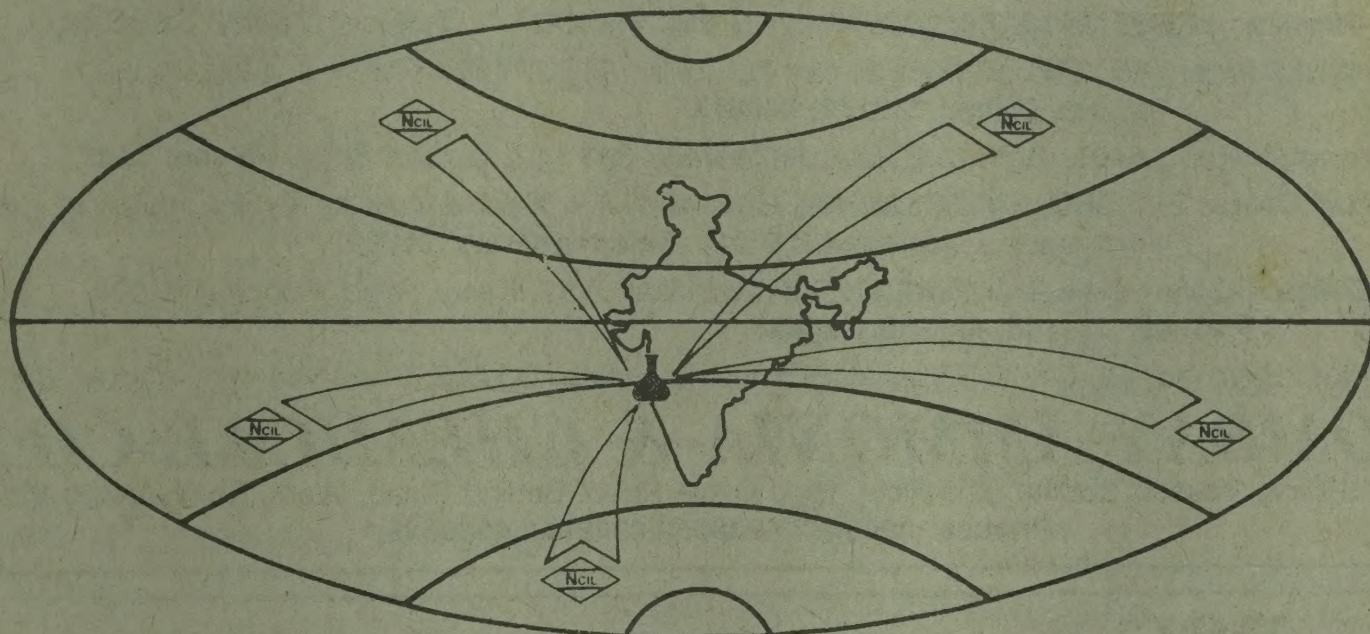


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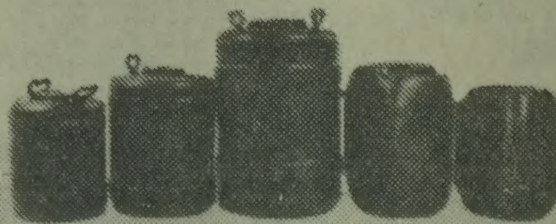
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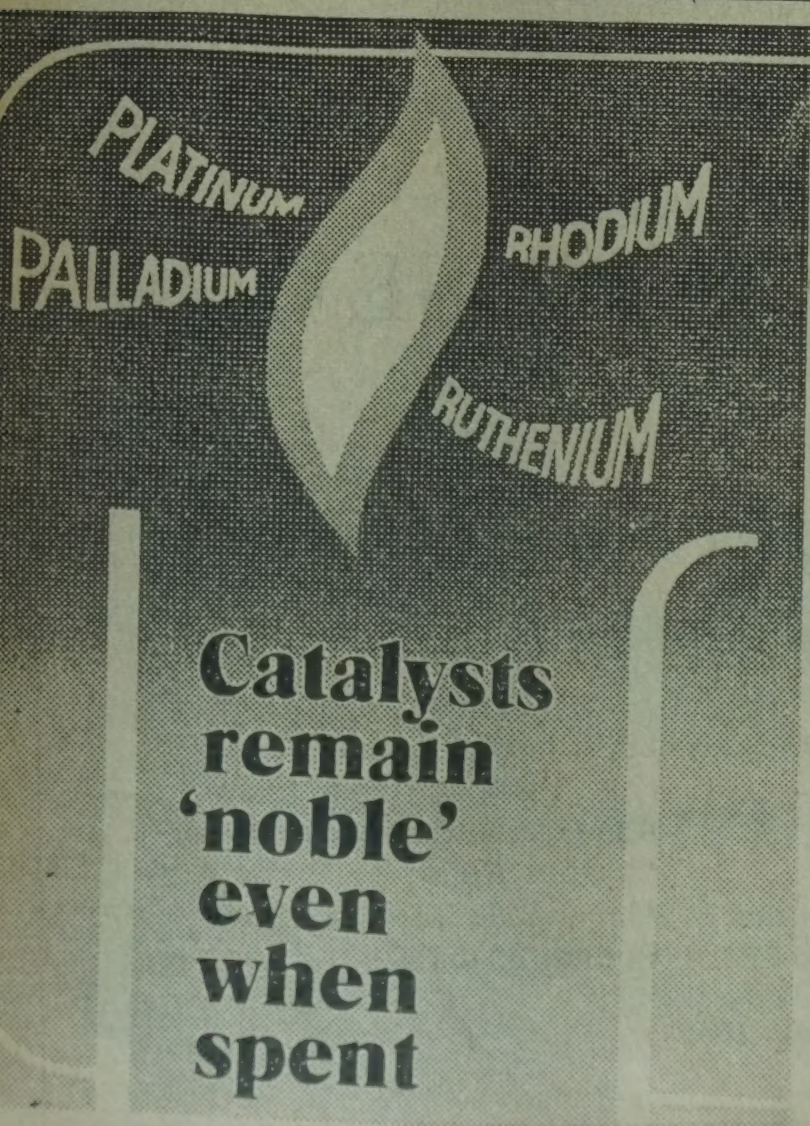
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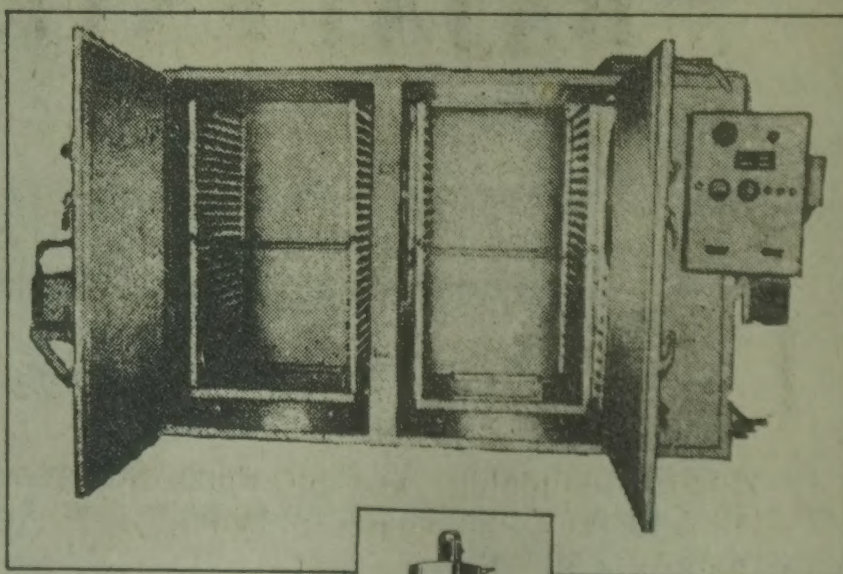
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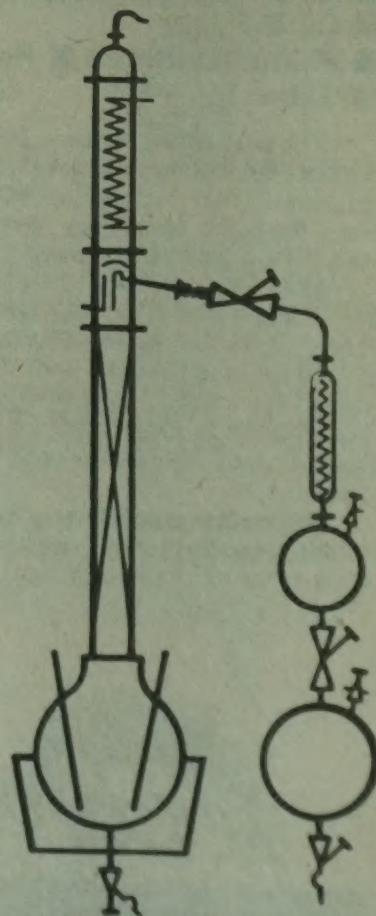
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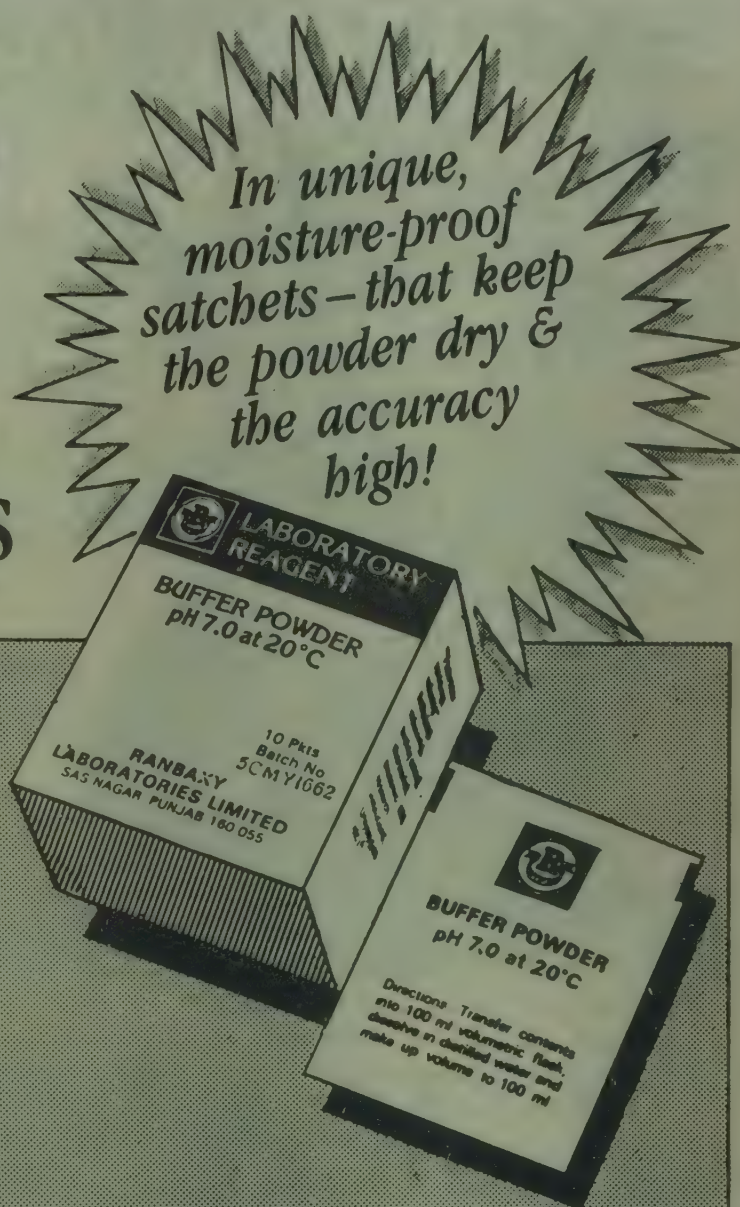
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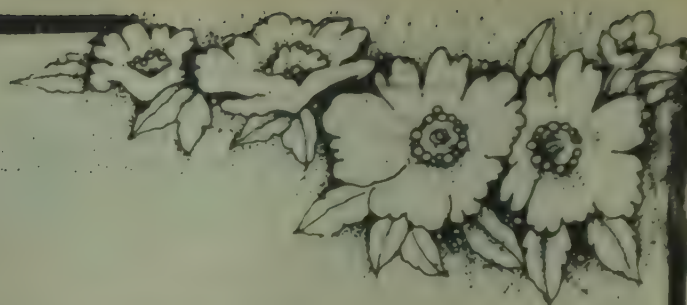
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Tel. No.: 509383/594144/594145

Telex: 011-79380 SMIM IN Fax: 31-22-6344985

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Phone: 410 TALOJA



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BUTYL CARBITOL ACETATE

CARBITOL ACETATE

CELLOSOLVE ACETATE

ISOPROPYL ACETATE

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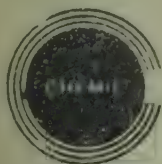
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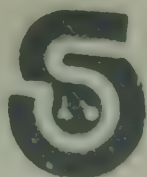
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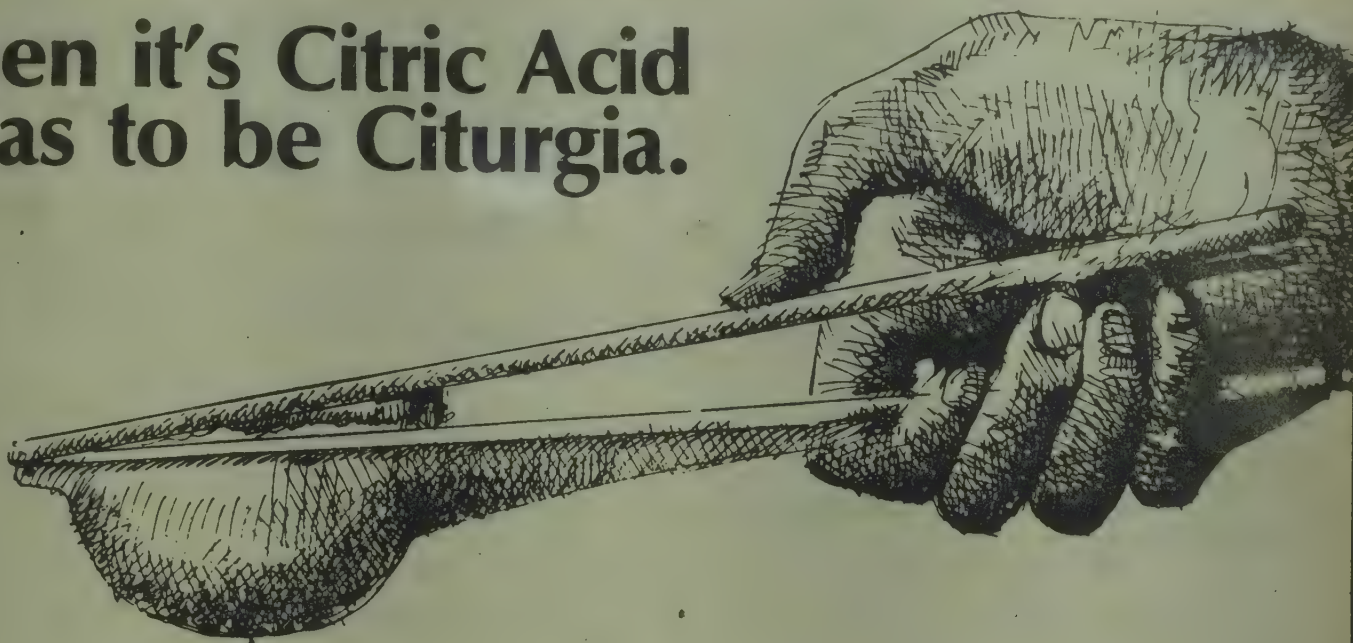
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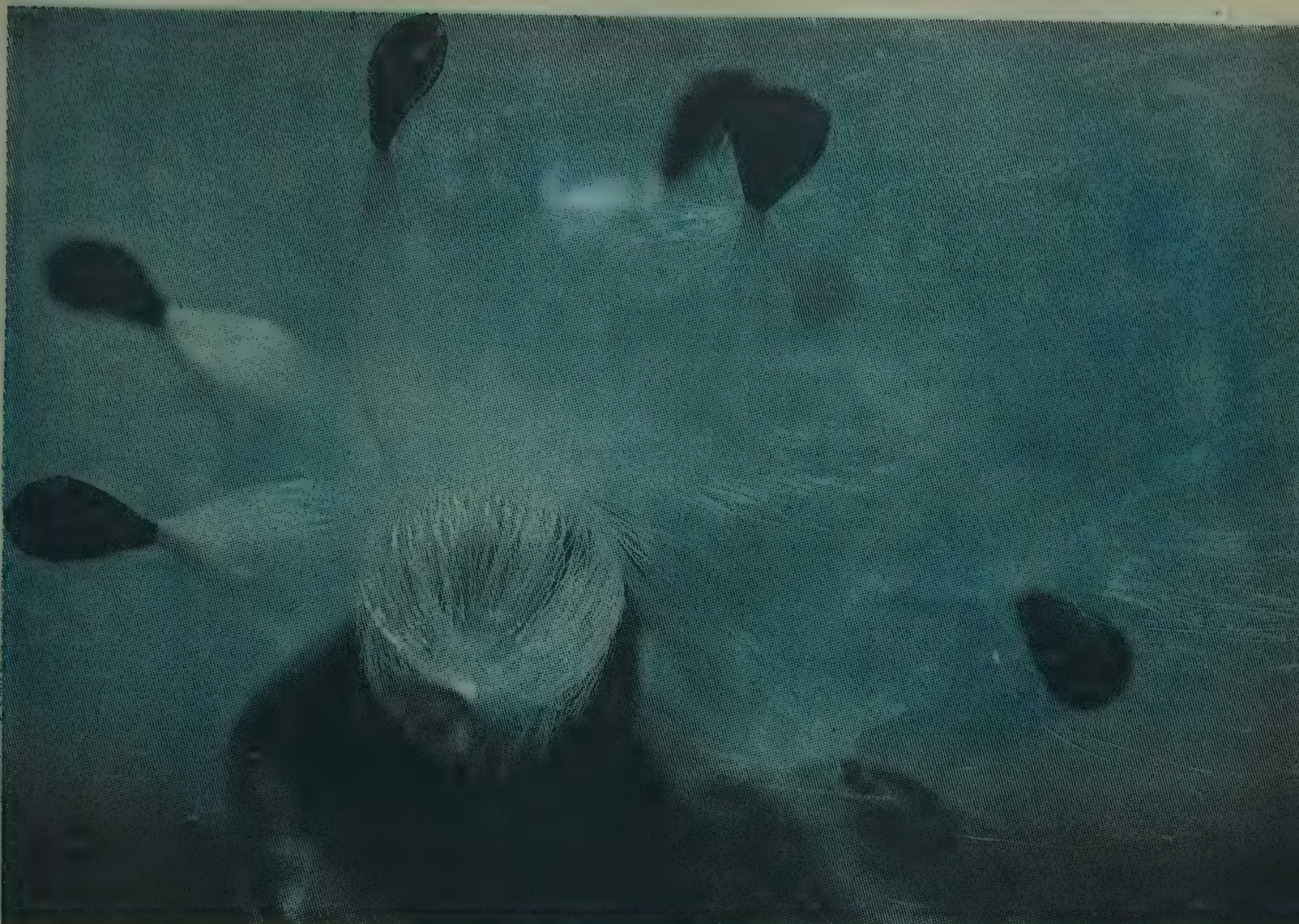
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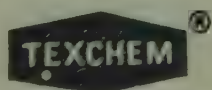


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# PARACETAMOL

IP/BP

## CHEMICAL Formula

Acetaminophen

4' — Hydroxyacetanilide

P — acetaminophenol

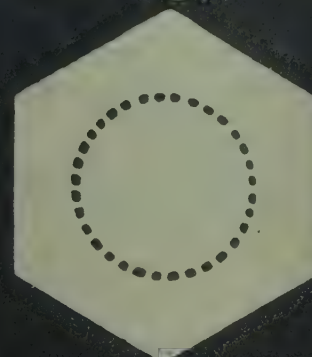
N — Acetyl p-aminophenol

P — acetaminophenol

P — acetamidophenol

## STRUCTURAL Formula

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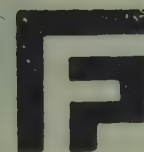
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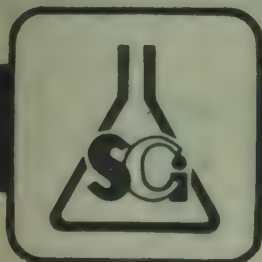
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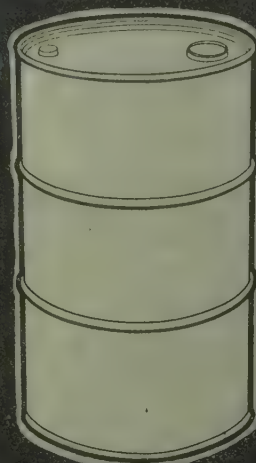
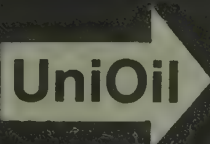
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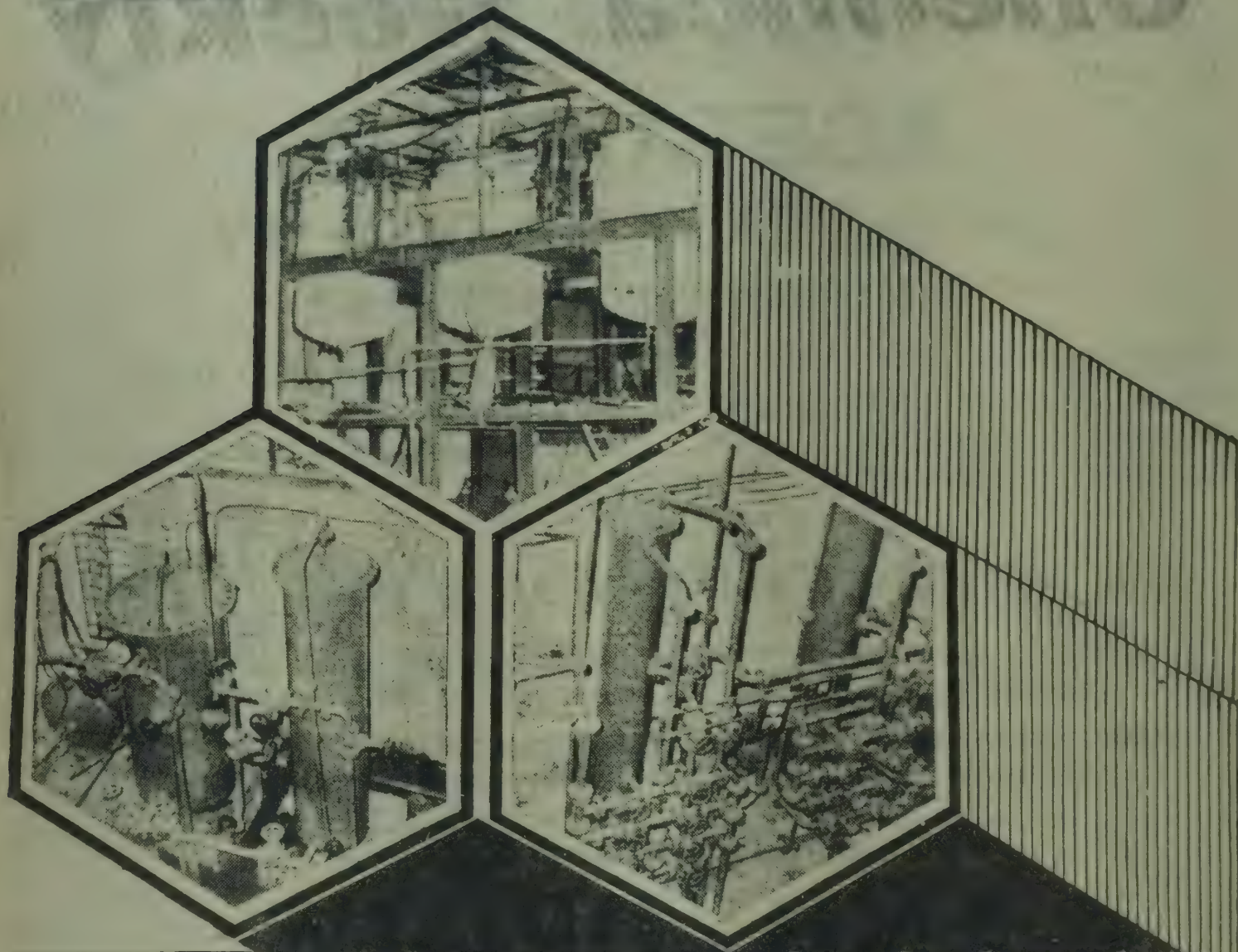
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# CHEMICAL WEEKLY

VOL. XXXVI SEPTEMBER 18, 1990

NO. 2

HERALDING THE 21st CENTURY - 67

## Pipeline Transport of Coal

For many years past, the coal industry has seen freight costs rising sharply. The effect of such steeply-rising costs on a basic industry is both serious and widespread, and is reflected in higher production costs. The first commercial coal pipeline was built in London in 1914, an 8 in. diameter cast-iron line being used to deliver lump coal from Thames barges to the stockpile of a power station some 1,750 ft. away. The chief objection to coal pipelines until 1945 was economic, since it was generally cheaper, or as cheap, to move coal by rail, road or water, and the capital cost of a pipeline would have been totally unjustified.

The widely-publicised Ohio coal pipeline, completed in 1957, is said to have cut freight costs of coal from the pithead at Cadiz, Ohio, to the Eastlake works of the Cleveland Electric Illuminating Company, some 108 miles away, by up to 50 per cent. The Ohio coal pipeline is the biggest installation of its type in the world, and was completed in 1957 by the Pittsburgh Consolidated Coal Company in an effort to overcome the swiftly rising cost of rail transport.

The 10 in. diameter steel pipeline delivers some 3,200 tons per 24-hour day of minus 1.17 mm. diameter coal as a 42 per cent solids content water slurry, the process water being treated with an inhibitor to minimise internal corrosion of the pipeline. The wall thickness of the line, which was constructed in accordance with the ASA Code for Pressure Piping (ASA B31), is 0.375 in. except at obvious points where frictional thinning is likely to occur, when it is increased to 0.5 in. These thicknesses are well in excess of the minimum required for the stated maximum operating pressure of 600 lb. per sq. in., the extra metal being allowed solely to compensate for the expected heavy wear due to frictional thinning. The estimated life of the pipeline is 15 years.

The line is protected against external corrosion by a single coat and wrap of coal tar primer and enamel, fibreglass reinforcement and kraft paper outer wrap, and is buried to 4 ft. cover to avoid possible frost damage during freezing weather conditions. Three pumping stations are installed, one of the inlet, one at mile 30 and the other at mile 60. Each station comprises two operating and one standby electrically-driven, reciprocating mud slush pumps, and in the case of electrical

failure at either of the two downstream stations, the next station upstream is capable of handling the extra load temporarily. Apart from the pumps and the pipeline loading valves, all coal-handling equipment used in the system is standard machinery already used widely in the coal industry.

The average velocity of the slurry through the line is 4.5 to 5 ft. per second, and the transit time of slurry through the system is to the order of 30 hours. On arrival at the terminal, the slurry is discharged into a settling tank in which the coal particles settle out by gravity and are pumped to disc filters for rough drying before being thermally dried to a specified minimum water content and stockpiled for use in the power-station boilers. The process water from the settling tank is flocculated until the estimated solids content does not exceed 10 parts per million, and is then discharged into the mains water outlet of the power station. This open cycle principle, in which the process water is discharged and not returned to the inlet of the pipeline for further use, is the only economical design for a long-distance coal pipeline in an area where water is cheap and plentiful. The closed cycle principle, on the other hand, has certain technical advantages and is of value in short lines, such as for raising coal from the pit bottom to the pithead.

**Pipelines in Europe:** The French coal pipeline, an 15 in. diameter steel line some 5.7 miles in length, was completed in 1947 to carry crushed and screened coal direct from the pithead to a power station. The throughput is almost 6,000 tons a day of minus 2.5 mm. diameter coal, slurried with water to a maximum of 15 per cent solid concentration. This line also operates on the open cycle principle.

The Russian pipeline, built in 1957 to carry crushed and screened coal of minus 0.794 mm. diameter from a central collecting point in a mining district to a power station, is a 12 in. diameter steel pipeline some 38 miles in length. The throughput is in the order of 4,800 tons a day of coal as a water slurry of up to 38 per cent solids content, with a velocity of 4.8 to 5 feet per second. This line is also of the open cycle type. A major pipeline, Block Mesa, was set up in 1970 to provide 4.8 mt coal a year from a coal mine in Arizona to a power plant in Nevada. This pipeline has established an

outstanding reliability record of better than 99%. Slurry pipelines are operating successfully to carry coal and other minerals in Florida, Utah, California, Arizona and Georgia and elsewhere outside US. Typical of the latter is a 67 km iron ore concentrate slurry pipeline between Kudremukh and Mangalore in India, using digital computer control operation, perhaps the first one of its type in the world.

A \$2 or 3 billion slurry pipeline can save, an average, \$1 billion per year in transportation cost. Besides the reliability is much better. The transport cost of a slurry pipeline is much lower (20%) compared to that for rail (60%). As the coal production in India is concentrated in the eastern and south eastern states coal movement over long distances of 1000-1500 Km. is inevitable. And the freight rate often exceeds the pit head price of coal.

When and where will be India's first coal slurry pipeline? Best prospects appear to be from Singrauli mines (M.P.); to Wankobari power plant (Gujarat)—1220 KM; to Vapi (proposed 2000 MW Station)—1000 KM; or to Ropar via Badarpur, Panipat & Bhatinda. Feasibility studies are being carried out and offers for supply of technology have been received from Canada, France and U.S.

Gujarat's coal problems: Coal supplies have been the bug bear of Gujarat's industry and Power Plants. As it is, the fuel cost of industries in Gujarat, the Gujarat Chamber of Commerce has pointed out, is 40 per cent higher than the all-India average. Successive increases have pushed the price of coal to Rs. 850 a tonne in 1989 from Rs. 287 in 1981, a 195 per cent increase in eight years. How totally dependent Gujarat is on coal for power may be seen from the fact that 90 per cent of power in the state is being generated in coal-based thermal plants. And yet coal linkage for thermal stations leaves much to be desired. At the best of times coal transport to Gujarat is irregular. Since the railway capacity is almost saturated Gujarat has made do with uncertain supplies.

The Planning Commission had rejected the Gujarat Government's proposal to lay a coal slurry pipeline from Singrauli to three power stations in Gujarat, at Wankbori, Ukai and Gandhinagar. But the commission was of the view that such pipelines could be considered in the future for large-scale power projects that involve huge quantities of coal over long distances.

The Gujarat Government had argued that a coal slurry pipeline was an attractive alternative to coal movement by rail, and further that moving coal by pipeline to power stations near the electricity consuming centres was cheaper than setting up super-thermal power stations at the pitheads.

The Planning Commission has accepted most of these arguments, but rejected the immediate proposal because the coal from this field has already been booked for other uses. This puts a spanner in the works of some international companies which specialise in laying slurry pipelines. India does

not have the technical expertise to do the job on its own and would inevitably have had to go in for foreign collaboration. Realising this, some foreign companies had been lobbying for the pipeline project from Singrauli to Gujarat.

The Commission, however, has noted that in a number of Western countries, particularly the United States, pipelines are increasingly replacing the railways when it comes to transporting vast quantities of oil and coal. Accepting the cost logic involved in this shift, it feels that the country could go in for its first coal slurry pipeline project towards the beginning of the Eighth Five Year Plan in 1990. This will be for major power projects in the west and north-west that involve moving 10 million tonnes of coal and more annually.

Another argument in favour of the pipelines is that given the geographical pattern of power consumption there is a limit to the number of super-thermal power stations that can be set up at the coal pitheads. For this reason power load centres will have to be dotted across the country. This would eventually make coal pipelines an inescapable option.

**The First Project in India:** Approval has been given for the preparation of a detailed project report at a cost of Rs. 93 lakhs for the setting up of a Demonstration Coal Slurry pipeline from New Majri Colliery of WCL and Chandrapur thermal power station of MSEB covering a distance of 40 km with an annual capacity of 800,000 tonnes with Engineers India.

**Conclusions:** Summarising, it may be fairly said that pipelines offer a promise of cheaper bulk transportation of coal than do existing methods, but only for small diameter industrial grades, and certainly not for lump coal at the present time, although this may come in the light of further development. The two essentials for an economic coal pipeline would be high load factor and the development of a simple, cheap method of dewatering the coal after transmission.

It is unlikely that coal pipelines will become commonplace for a number of years, however, for several reasons. Firstly, the economics must be proved beyond all doubt by large scale demonstration models, followed by more ambitious operating systems. Secondly, although it may be said that such pipelines would clear a great deal of rail and road traffic from the already overburdened transport system, such an advantage would be more apparent than real for a long time, and at no time would pipelines be able to clear traffic from urban areas, as distinct from trunk roads. Lastly, the amount of coal transported even by a network of such pipelines would be only a small percentage of the total coal mined, due to the selective diameters of coal which can be transported most economically and due to the very wide distribution of industrial coal users throughout the country, not all of whom could be supplied in this way. Consequently, unless the actual consumers of the piped coal were given the financial benefit, to the exclusion of all other consumers, which is most unlikely, the overall effect on the total transport charges of the industry would be small.

— T.P.S. RAJAN

# CHEMARENA

S.L. VENKITESWARAN

## Butadiene

Butadiene is the olefine (diolefine) which has had uncertain progress over the years and it was always sold at prices lower than for the  $C_2/C_3$  olefines. Although it has a wide range of uses, the bulk of these relate to synthetic rubber. The small and medium cars, radial tyres and the much tougher tyres have left the offtake of synthetic rubber static in USA for some years. Europe depends on naphtha cracking plants to meet the butadiene demands and has had some quantity for exports but the position may come under strain in the coming years.

The use pattern in USA is estimated as under for 1989:

SBR	...	35%
PBR	...	23%
Nitrile rubber	...	3%
ABS	...	6%
Polychloroprene	...	6%
SBR & other lattices	...	11%
HMDA	...	12%
Others	...	4%
Out of total 1.6 million tonnes.		

US production of tyres had been on decline and imports of cars with original equipment (of tyres) have cut into the demand. International Institute of Synthetic Rubber Producers (IISRP) forecast that US-Canada demand will grow at 0.7% in 1990 and prices prevail at 27 to 29 cents/lb. Co-product from naphtha crackers provided 68% of supplies in 1988 and two more naphtha crackers may go into production by 1992. Canada is a supplier and US imports about 25% of its requirements.

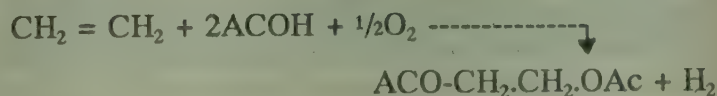
The major chemical use of butadiene is for hexamethylene diamine (HMDA) the intermediate for nylon 66 for which the demand is static. The possibility of shift to other feedstock for HMDA are always under study but not yet ready for commercial operation.

India has abandoned butadiene production from ethyl alcohol and is now dependent on imports to supplement the supplies from naphtha cracking. This situation will continue and get buffeted by the dislocation of oil supplies in the wake of the Middle East crisis.

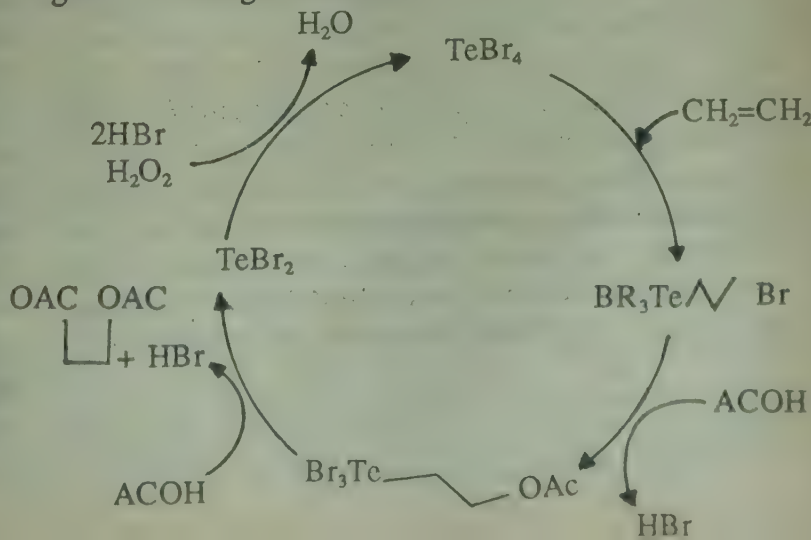
## Ethylene Glycol directly from ethanol or ethylene?

Activated carbon-hydrogen bond such as in methyl radical has been attracting much attention of late -- mainly conversion of methane to more useful chemicals. Carbonylation of methanol is a very successful commercial process. But can the  $CH_3$  in ethyl alcohol lead to ethylene glycol by hydroxylation? Chemists at the California Institute of Technology, Pasadena, report that a mixture of platinum salts is able to do this hydroxylation with enough selectivity -- JACS-112-5628 (1990). Heating ethanol in an aqueous mixture of Pt(II) and Pt(IV) salts resulted in glycol and several other products -- acetic acid, glycolic acid in low yields. The attack on  $CH_2OH$  group also occurs and perhaps a lot more work is required before a practical process for MEG can result. Today it is only a distinct and distant possibility and as a country with a lot of interest in ethanol we should set in motion some research on these lines.

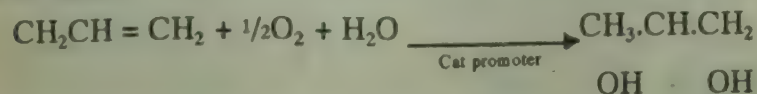
But there is another approach for ethylene to MEG reported by Halcon using a homogenous catalyst based on tellurium and hydrogen bromide to get the mono and diacetals of MEG. These are hydrolysed to the glycol and acetic acid is recycled. The reaction is said to be as under:



The selectivity is said to be near 95% but rate and concentrations and catalyst used are not known. The reaction is assumed to be similar to that of acetaldehyde from ethylene by the Hoechst/Wacker process. The proposed mechanism is given in the figure below.



Another process for propylene oxidation using Osmium tetroxide as catalyst with a promoter such as cupric chloride or bromide is reported by chemists at Exxon Chemical. Osmium is used as the tetroxide or halide and the reaction is as under:



and under about 100°C and below 1000 psi pressure. This is a direct oxidation of propylene to the glycol and not indi-

rect through a peroxide but there is no claim on reaction of ethylene. Polar organic solvents miscible with water are used. It is still too early to expect commercial use of such a reaction for propylene glycol, let alone of ethylene glycol. The catalyst is costly and its recovery would be critical.

The more practical way to MEG from ethylene directly is the use of peracetic acid for the reaction and get coproduct acetic acid along with glycol. Such a process for propylene oxidation is already commercial.

## Greenhouse Economies

Environments and hazards are the in-theme for today so much so that the prestigious "*Economist*" of London devotes a lengthy article to the subject of "Greenhouse Economies". The subject is global warming and the so-called greenhouse gases which contribute to this great risk and there is need for careful cost benefit analysis instead of panicky over-reaction to the consequences of fossil energy use and its impact. Scientific monitoring has firmly established two things -- the increasing levels of CO<sub>2</sub> in the atmosphere due to the burning of fossil fuels and consequent warming of the atmosphere. The second thing is ozone depletion in the ice-bound expanse of the Antarctic. Other gaseous emissions like CFC's, methane also add their mite to the greenhouses gases -- a term which means a warm-up of the atmosphere. There is a lot of thinking and analysis of the rainfall levels, water levels and flows, extremes of droughts, climate changes but such data is not considered adequate for forecasts of the future levels of CO<sub>2</sub> rise and temperature rises. Climate change is said to be *terra-infirma* and social and economic impacts of climate change not reliable enough. There are too many uncertainties to enable firm conclusions but the majority view is that the projected risks even if questionable to some extent are far too disastrous not to heed the warnings even at this stage.

It is projected that climate has little economic impact upon advanced industrial societies. Only 3% of American GNP originates in climate sensitive factors such as farming and forestry. Another 10% comes from sectors only moderately sensitive -- energy, water systems, property and construction. Farmers have the ability to adapt to changes in environmental conditions and while yields of many crops may be reduced the higher CO<sub>2</sub> level will have benefits too. Manufacturing, mining, utilities, finance, trade and most services are not likely to be affected by the greenhouse gases. But the studies indicate an acceleration in sea level of one foot over the next century -- not a proposition to be alarmed about.

Developing countries are far more vulnerable with about

a third of GNP originating from agriculture and much vulnerable to climate change. But developed countries are mostly safe from such changes. Prognostication of disaster are subject to much uncertainties and could be dead wrong on the effects of global warming. But even so steps to counter CO<sub>2</sub> build-up are called for even if the effects may be a century ahead. Reducing and phasing out CFC's is an agreed programme. Reduction in use of fossil fuels or of extensive reforestation is part of present day thinking. Energy studies indicate that a 10% reduction of CO<sub>2</sub> emissions can be attained at modest costs and even 20% over a longer period. But this is not merely postponing the day of disaster. 60% of reduction in CO<sub>2</sub> emissions is estimated to cost over \$300 billion per year. Trade-off between economic growth and slow down in emissions is necessary and the article suggests an international "carbon tax" to be introduced gradually. But the special case of developing countries receives little thought though activity by them will have global impact. Is there a possibility of extensive growth of carbon eating organisms to counter CO<sub>2</sub> build up?

Climate systems are extremely complicated and not easy to visualise over the centuries. Ice cap melting and rise in sea level is too uncertain to be taken as a portent to disaster. There is recognition that global warming is a reality and a global issue calling for international cooperation. Affluent nations may need to expand the concept of foreign aid to include subsidising environmental improvement by poor nations. There is need for more intensive study and analysis of the economic and social impacts of future climate change. Replacing fossil fuel gradually and resort to nuclear power are inevitable. The concept of taxes on carbon say \$ 5 to 10 per tonne of CO<sub>2</sub> equivalent needs detailed analysis though there may be few takers of this as an alternative to regulatory intervention.

For India there is need to take a look at global issues of climate disruption and move away from the present day pre-occupations with castes and reservations.

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## UB Petro commences commercial production

UB Petroproducts Ltd. (UBPP) a joint venture of the UB group and the Tamil Nadu Industrial Development Corporation, has commenced commercial supplies of its products viz. propylene glycol, polyols and propylene oxide. Trial production had commenced from August 1, and about 200 MT had already been sold in the first month. The plant was formally inaugurated by the Tamil Nadu Chief Minister Shri. M. Karunanidhi on August 12. With commencement of supplies UB Petroproducts becomes the first company to commence commercial production of these import substitute chemicals. Manali Petrochemicals Ltd., has also commenced supplies of glycols. Its' polyol project however has been slightly delayed due to late arrivals of some machinery and trial production is expected to commence by October.

### Commencement in record time

UBPP has built the plant in a record time of 16 months after site mobilisation, in technical collaboration with Pressindustria AG, Switzerland and Montedipe Srl, Italy. The company has tied up with Madras Refineries Ltd. (MRL) for supply of propylene feedstock and with other companies for raw materials such as limestone, lime, chlorine etc. The company has already created sufficient awareness of the versatility of

spread distribution network for its products. Regionwise distributors are as follows: **New Delhi** — Paras Dyes & Chemicals, Kapoor Chemical Corporation; **Ahmedabad** — Tradex Corporation; **Bombay** — Eastern Organics, Ramniklal S. Gosalia, Krupa Trading; **Madras** — Muthu Meena Agencies, Reichhold Chemicals India Ltd; **Bangalore** — Somu & Co; **Calcutta** — Asian Distribution Trade Corporation.

### Propylene Glycol uses

UBPP propylene glycol is a high quality and high purity product meeting the standards of a USP grade material. The company has taken necessary steps for the approval of Indian Pharmacopoeia. Major applications of the chemical are as under.

#### In Pharmaceutical Industry

As a carrier, solvent, emollient and humectant, propylene glycol is used in many preparations including estrogen and vitamin formulations, antiseptics, salves, elixirs and ointments.

#### In Food Industry

Propylene glycol USP/IP is used as a solvent for extraction of vanilla flavour from vanilla beans, coffee flavour from roasted coffee, and such other flavours.

#### Licensed and installed capacity (MT) are as under:

	Licensed capacity	Installed Capacity
Polyether polyols	12,000	8,000
Propylene glycols	12,000	7,000
Propylene oxide	12,000	12,000

Polyol applications. A seeding programme for propylene glycol has been successfully implemented using material from the foreign collaborators. The experience gained in this programme is expected to pay rich dividends in the marketing of indigenous materials. The company has also financed a wide-

As a solvent for food colours it has the advantages of lower volatility and lower cost.

Food antioxidants such as Butylated hydroxy anisols (BHA) and butylated hydroxy toluene (BHT) are sold dis-

solved in propylene glycol.

As a solvent for inks used in food packaging.

As a humectant it is used to increase the shelf-life of baked goods.

As a plasticizer for cork.

As heat transfer medium in the cooling of beer, wine, milk and other liquids, and in the immersion freezing of poultry and other foods.

### In Tobacco Industry

Propylene glycol, USP/IP, is utilised in the tobacco industry for its properties as a humectant, plasticiser and solvent. Its main use is in cigarette manufacture but it is also employed to plasticize cigar wraps and in pipe tobacco, chewing tobacco and snuff. After the tobacco has been aged as desired, the leaves are stripped from the stems and shredded to the desired size. To prevent breaking and crumbling during this and following operations, the leaves are sprayed with a 'casing' mixture, composed mainly of propylene glycol, USP/IP, sugar and water, before stripping from the stems. Generally speaking, less than 5% glycol is required to maintain the desired moisture content in the tobacco over a wide range of relative humidities. The glycol also helps in providing a 'fresh' quality product.

Besides being an excellent humectant and plasticizer, propylene glycol, USP/IP has all the requirements of a solvent for the various flavouring materials used in the tobacco industry. In addition the glycol helps to retain the flavour of the tobacco.

### In Cosmetic Industry

In vanishing creams, propylene glycol aids in the formation of a smooth product. Soap products, and shampoos can also use propylene glycol.

### DIPROPYLENE GLYCOL

UBPP dipropylene glycol can be used as:

Chain extender in the manufacture

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of polyether and polyester that are used in producing polyurethane foams.

Solvent for resins, nitrocellulose and many organic compounds.

Hydraulic fluid in brakes and shock absorbing fluid.

Textile lubricants and as water miscible solvent in printing ink formulations.

Solvent in extraction processes for separating aromatics from other hydrocarbons.

Raw materials for the manufacture of esters and other chemical intermediates.

#### **UBPP plans for immediate future:**

\*Production of 14 different grades of polyols required for the manufacture of polyurethane flexible slab stock foam, rigid polyurethane foams for insulation, packing application, wood substitute articles, polyurethane elastomer applications and polyurethane semi-rigid foams for the manufacture of automobile components, furniture etc.

\*Company is pursuing with the Government of India for bringing MDI/TDI (Toluene Di-isocyanate), which is the other important raw material for flexible foam manufacture, under "stock and sale" category of imports for ease of availability to foamers, who are in the small scale industry sector.

\*Provide sufficient quantity of propylene oxide to Indian market, thus removing the hurdles of import of this precious raw material, giving a boost to the manufacturer of:

1. Propylene oxide condensates, emulsifiers, de-emulsifier, softener, corrosion inhibitor.
2. Ethoxylated condensate propoxylates.
3. Aquapolymer hydroxyethyl guar.
4. Hydroxy propyl guar.
5. Ethylene oxide-propylene oxide-copolymers.
6. Propylenated products.
7. Oil field chemicals.
8. Amides and derivatives.

#### **9. Defence application.**

The company is actively considering the possibilities in exports. A small trial order to a neighbouring country has already been achieved, and the company is optimistic of its changes.

The ready availability of these import substitution chemicals in quantities that meet the all India demand, will enable the Government of India to save nearly Rs. 50 crores per annum in Foreign Exchange.

---

#### **OSWAL PETRO EXPECTS RS.120 Cr. TURNOVER FROM CHEMBUR PLANT**

---

Oswal Petrochemicals expects a turnover of Rs. 120 crore from its Chembur plant in 1990-91 by upping the production of Low Density Polyethylene (LDPE) and other olefins.

This was stated by Mr. Abhay Oswal, chairman, Oswal Petrochemicals in the course of the plant visit to Chembur at Bombay on Sept. 9th. Mr. Oswal said that though there had been no expansion, the modernisation had cost the company Rs. 40 crores. The entire modernisation was according to standards set by Engineers India Limited (EIL), he said.

The result of the modernisation was that in the field of power generation the company would save about Rs. 10 crores. The company's power demand at Chembur plant was to the tune of 10.5 mega watts. At present they were paying Rs. 1 crore per month as power bill, he said. He was hoping to increase the percentage of ethylene produced from 26 per cent to 32 per cent by further fine tuning in some other areas he said.

The second aspect of the plant was that it had been geared up to be environmentally conscious. Tree plantations, regular atmosphere checks, blast, walls, water curtains, installation of hold up

pits, and instruments and equipments for better operations of effluent treatment plant were considered.

Mr. Oswal further said that the plant had started functioning after four years. It had been closed down by its earlier owners Union Carbide Chemicals and the Oswals had bought it in August 1989.

The Oswal Agro Mills was going to commission a sugar mill at Moradabad, UP, on October 30, 1991 at the beginning of the sugar crushing season. Initially 3,000 tonnes would be crushed, he said.

He felt that his power generation programme in Shahjahanpur would yield good results. The 260 megawatt plant costing Rs. 250 crores would supply electricity to the UP government at the cost of 95 paise per unit while it would cost 55 paise per unit to produce electricity, he said.

In case of the Shahjahanpur fertiliser plant Mr. Oswal felt there would be a delay of about six months. Though the civil works have been completed, and the machinery identified, the company was awaiting certain government clearances.

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#### **DGTD MEET TO REVIEW DMT, PTA SUPPLY**

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DGTD has decided to convene an urgent meeting on September 21 to review supply of position of DMT/PTA in view of the recent cut in naphtha supply. The meeting to be held in New Delhi will be attended by representatives of polyester fibre and filament yarn manufacturers and producers of DMT/PTA. The government had earlier reviewed the supply and demand position for DMT/PTA, basic raw materials for the polyester industry. Considering the likely shortfall in supply, the authorities had decided to permit import of these materials against additional licences.

## ICMR awards for 20 scientists

Twenty scientists were presented the Indian Council of Medical Research (ICMR) awards for excellence in various fields of medicine. Presenting the awards, the Minister of State for Health and Family Welfare, Mr. Rashid Masood Sahib, said technology had to be adapted to suit the socio-cultural and economic conditions of our people. There is also a need to improve the outreach of health services so that the under-privileged sections of society can benefit by them, he said. The scientists who were presented the awards were:

Dr. S.S. Guraya, Punjab Agricultural University, Ludhiana, Dr. M. Krishnan Nair, Regional Cancer Centre, Trivandrum, Dr. Usha Gupta, All India Institute of Medicinal Sciences, New Delhi, Dr. Indu Gupta, PGIMER, Chandigarh, Dr. J.S. Mathur, Lirm Medical College, Meerut, Dr. K. Krishnamachari, Regional Medical Research Centre, Jodhpur, Dr. U. Sengupta, Central Jalma Institute for Leprosy, Agra, Dr. S.P. Thyagarajan, A.L. Mudaliar PG Institute of Basic Medical Sciences, Madras, Dr. Urmila Pingle, National Institute of Nutrition, Hyderabad.

Dr. Sumitra Dass, PGIMER, Chandigarh, Dr. T.N. Raghava Varman Thamapan, Central University, Hyderabad, Dr. V.P. Sharma, Malaria Research Centre, Delhi, Dr. P.N. Kulhara, PGIMER, Chandigarh, Dr. Dinesh K. Bhargava, AIIMS, New Delhi, Dr. Santosh K. Bhargava, Paediatrician, New Delhi, Dr. B. Ravindran, Regional Medical Research Centre, Bhubaneswar, Dr. G.P. Pal, Government Medical College, Surat, Dr. Kiran Katoch, Central Jalma Institute for Leprosy, Agra, Dr. S.K. Jindal, PGIMER, Chandigarh, and Dr. H.P.S. Sachdev, Maulana Azad Medical College, New Delhi.

**BOMBAY DYEING HIKES DMT PRICE BY Rs. 3,000**

The Bombay Dyeing has decided to

hike the price of DMT from Rs. 24,000 a tonne to Rs. 28,000 with effect from Sep. 10th. The company has also decided to offer a discount of Rs. 1,000 per tonne at present so that the effective increase in price works out to Rs. 3,000 a tonne.

The company is the largest producer of DMT in the country followed by IPCL and BRPL. Both the other DMT producers are soon expected to follow.

Reliance Industries is the lone producer of PTA in the country and it is also likely to raise the selling price, according to industry sources at Bombay. DMT and PTA are alternative basic raw materials for polyester fibre, yarn and film manufacturers. The industry sources were expecting a hike in the price of DMT by Bombay Dyeing any time in view of the recent spurt in the price of paraxylene from \$ 500 to 600-625 per tonne in the international

markets.

( For earlier news see page 56)

## SHORTAGE OF NAPHTHA MAY FORCE PSF UNITS TO CLOSE

The Association of Polyester Staple Fibre Manufacturers has urged the government to restore full availability of naphtha and paraxylene as the DMT and PTA producers have informed all PSF manufacturers of possible cuts in supplies. In a press release issued at Bombay the association said if the government does not restore full supplies of naphtha, PSF units would have to shut down, leading to a virtual shortage of cloth during the coming festive season. The association has also refuted charges that its PSF members have increased their product prices by stating that the price being charged by the manufacturers to their consumers are well within the BICP guidelines and well below what is considered 'remunerative'.

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## SETTING UP OF AMMONIA PLANT

**Deepak Fertilisers' application rejected**

The Union government has turned down Deepak Fertilisers and Petrochemicals Corporation Ltd.'s application for setting up a Rs. 125-crore 300 tonne per day ammonia plant, without giving any reason. The rejection comes at a time when Minerals and Metals Trading Corporation (MMTC), the canalising agency for ammonia imports, has cautioned fertiliser units that it cannot assure future supplies in view of the Gulf crisis. The fertiliser industry imports more than one million tonnes of ammonia a year at approximately US dollar 175 a tonne.

The ammonia market showed an uptrend since March, boosted by a four lakh tonne purchase by India, the main buyer of Gulf ammonia. The ban on Kuwait product is bound to push up prices further. Other regular buyers of Kuwaiti ammonia like South Korea are likely to turn to Saudi Arabia, UAE, Bahrain and Qatar. The UN embargo came at a time when both Iraq and Kuwait were negotiating urea exports to China, world's largest buyer of this fertiliser. A spokesman for Rashtriya Chemicals and Fertilisers (RCF), the leading fertiliser producer in western India, said that though MMTC has informed the company about the difficult times ahead, the company does

not foresee the likelihood of having to cut back urea production in the near future. "We have back up supply from Deepak Fertiliser. Also, Kribhco has told us that they could spare 100 to 150 tonne a day for us", he said. Enquiries reveal that Gujarat Narmada Valley Fertiliser Company Ltd. (GNFC) will have little ammonia to spare as the company is to commence ammonium nitrophosphate (ANP) production soon. Zuari is a net importer. IFFCO imports through Kandla port. Government's plans to set up various fertiliser units in the Gulf to take advantage of cheap fuel prices in the region appear jinxed.

Deepak's Talaja unit is the only merchant producer of ammonia as it does not produce the downstream fertiliser products at present. The company has the largest storage tank for ammonia which will have lot of idle capacity when the company begins to produce ANP. Apart from infrastructure and utilities, the company also has an under-utilised gas pipeline from ONGC's Uran facility to Talaja.

Deepak is currently selling ammonia to RCF and Zuari. Deepak's application envisaged merchant sale of 70 per cent of the ammonia to be produced at the new plant. Thirty per cent would be

converted to value-added products for exports. The project would have saved foreign exchange to the tune of US dollar 15 million a year, the company claimed. It has written to the government seeking reconsideration of the application. The company, which suffered a labour unrest during September-October last year, has been achieving more than 100 per cent capacity utilisation in recent months. Production for the period April 1, 1990 to August 31, 1990 at 40,535 tonne is 17 per cent more than that during the corresponding period last year.

Sales turnover during the period showed a 27 per cent increase. "Carry forward profits of last year exceed the dividend outgo", according to company sources.

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Sree Rayalaseema Alkalies and Allied Chemicals has produced good results during the year ended March 1990. The turnover has more than doubled to Rs. 24 crores from Rs. 11.14 crores in the previous year. The operating profit has also more than doubled to Rs. 7.65 crores from Rs. 3.79 crores. Despite a significant rise in interest liability to Rs. 406.97 lakhs from Rs. 182.09 lakhs, the gross profit has shot up to Rs. 357.92 lakhs from Rs. 196.84 lakhs last year.

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## Petroleum prices not to be increased

The government decided on September 12, not to increase the price of petrol and petroleum products or to introduce rationing of petrol for the present despite a projected additional burden of Rs. 3,000 crore in the crude import bill.

At an all-party meeting, convened by the Prime Minister to consider the situation arising out of the Gulf crisis, major political parties, including the ruling party allies the BJP and CPI and CPI-M, opposed any price hike on the grounds that it would have a cascading effect on the prices of essential commodities.

The meeting was also attended by the petroleum minister, Mr. M.S. Gurupadaswamy, his deputy, Mr. Bajaman Behera, steel and mines minister, Mr. Dinesh Goswamy and Parliamentary affairs minister, Mr. P. Upendra.

An official spokesman told newsmen at New Delhi that it was decided that another meeting be convened to discuss the difficult balance of payments position vis-a-vis the increased oil import bill and limited foreign exchanger resources against the backdrop of the Gulf crisis.

The Prime Minister, Mr. V.P. Singh, told the meeting how the Gulf crisis had affected the oil import bill straining the already difficult balance of payments position.

Mr. Singh told the parties that although no precise figure for foreign exchange required to meet the increased cost of oil imports could be given because of the fluctuating prices, a rough estimate put it at over Rs. 3,000 crores.

He asked the political leaders for suggestions on how best to meet the situation and raise the required resources. The Prime Minister said some of the recent decisions of the commerce minis-

try, like the transfer of some items to the OGL, would net Rs. 1,000 crore and another Rs. 800 crore would come from corporate levies.

Leaders of political parties felt that to tackle resources crunch measures should be taken to unearth black money and some taxes should be raised. However, they said, the people should be spared another petroleum product price hike.

The government had raised petroleum prices in the 1990-91 budget much before the Gulf crisis and the hike was the steepest since 1972. The petroleum and chemicals minister, Mr. M.S. Gurupadaswamy told the meeting that petroleum product imports had to be restricted to around 24.3 million tonnes as against last year's consumption level of 25.2 m.t.

Imports had to be pegged to last year's level of Rs. 6,400 crore, he said. The Gulf crisis had inflated the oil import bill following the upsurge in prices as supplies had got disrupted. Every dollar increase in the price of imported crude meant a foreign exchange outgo of Rs. 400 crores, he added.

Mr. Gurupadaswamy said the gap between demand and supply would still be unbridged, necessitating imports and in the context of the high prices of crude oil there was no other option but to restrict consumption to levels slightly below last year's and conserve petrol and diesel.

The impact of the Gulf crisis was not temporary and its effects would be there for some time to come, he said. Various conservation measures introduced by the government since June this year had a certain impact, he said.

The growth rate of LPG for April to August this year was placed at only 14.4 per cent against 15.6 per cent for

1989-90 and that of petrol 8.4 per cent against 14.4 per cent last year during the same period.

For high speed diesel oil, it was put at 5.8 per cent from April to August this year against 10.7 per cent last year.

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### RELIANCE HIKES PTA PRICE

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Reliance Industries Limited (RIL) has hiked the price of purified terephthalic acid (PTA) from the present Rs. 24,550 per tonne to Rs. 29,700 per tonne.

According to RIL sources, the increase is attributed to the escalation in cost of producing intermediates used for PTA. The increase in PTA prices by RIL comes just a day after Bombay Dyeing increased the price of di-methyl terephthalate from Rs. 23,500 per tonne to Rs. 28,500/tonne.

The government, it will be recalled, had asked both DMT and PTA producers in February to reduce their prices to Rs. 23,500 and Rs. 24,550 per tonne. At that time, PTA was priced at Rs. 32,625 per tonne.

RIL had agreed to reduce the PTA price to the government-suggested level under protest. After about six months, both the DMT producer, Bombay Dyeing, and the PTA producer, RIL, have jacked up the prices. (Also see pg. 56).

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### COAL IS THE ONLY ALTERNATIVE FOR INDIA: ENVIRON SECY.

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In the context of the stagnating gas and oil production in the country, the only alternative is coal, according to environment secretary, Mr. Mahesh Prasad. Inaugurating a six-day conference on "Energy planning for South Asian countries", Mr. Prasad said nuclear energy would be a fairly expensive option in terms of capital requirements and associated risks.

## Many combinations under DPCO

A large number of combination drugs have been brought under price control by altering their definitions. With immediate effect government has decided that there is no major or minor therapeutic ingredient in a combination formulation and all ingredients have "equal therapeutic value". As such all combination drugs containing even a trace of bulk drugs which are under price control will come under the price regime.

The quiet move of the Ministry of Petroleum & Chemicals only proves the point of the drug industry that Mr. M.S. Gurupadaswamy cannot be taken for granted. Under the earlier policy, a combination drug could only come under price control if the scheduled bulk drug in the combination formed a major therapeutic agent.

More, if the major agent was a drug item falling in Category 1, the combination drug fell in Category 1 and if the drug item fell in Category 2, the combination drug came under Category 2. But, if the scheduled bulk drug was a minor therapeutic agent, the combination drug was kept out of price control. All these fine-tunings have been scrapped.

In a letter written to the Bureau of Industrial Costs and Prices the Ministry of Chemicals and Petroleum, states, the Standing Committee constituted by the ministry, had reexamined the issue and decided on the new move. The letter states, 'All such combination formulations containing Category 1 bulk drug will be treated as Category 1 formulation. Similarly combination formulations containing a Category 2 bulk drug with non-scheduled bulk drug will be treated as a Category 2 formulation'.

The Standing Committee has usurped to itself powers to define a drug which properly belongs to the Drugs Controller. It is the Drugs Controller, stationed in Delhi, who sanctions manufacture

and sale of combination drugs with the powers of state drug controllers now pruned. Number of combination drugs falling under price control cannot be estimated as the various industry associations are collating data. They are upset with the government move and fits in with fears of the industry that the government is keen on keeping out the drug industry from the liberalisation plans.

When this move is fitted in with earlier government decision to bring more drugs under price control, it is clear DPCO 1987 stands considerably diluted.

### NEW TREATMENT FOR CANCER

Human beings have been treated with genetically engineered cells for the first time. Scientists say the study could herald treatment for a wide range of diseases originating in the molecular build-

ing blocks of life.

The study, involving five patients with malignant skin cancer, introduced genetic material into cells taken from human volunteers and reinjected them back into the subjects.

The test, reported recently in New England Journal of Medicine, was not designed to eliminate the tumours but to help researchers understand how to make the promising cancer treatment of genetic engineering even more effective.

Two of the patients enjoyed full or partial remissions. There were no unusual side effects and tests showed that the modified cells persisted in the circulation and at the tumour site for upto two months. "Until now, we were uncertain if gene-modified cells could survive in the patient's body long enough to be useful for therapy", said the Director of the study, Dr. Steven A. Rosenberg of the U.S. National Cancer Institute.

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## Hoechst moves court against Govt. claims

Hoechst India Limited has filed a petition against the Union Government in the Delhi high court on Aug 31st. It appealed against the government directive that the company has to pay Rs. 25 crore as arrears under the Drug Price Equalisation Amount (DPEA), Mr. C.L. Jain, director of Hoechst revealed.

The government issued three notices to the company on May 30, 1990. It alleged that Hoechst had earned unintended profits in the formulation of three drugs, baraligan ketone, frusemide and pheniramine maleate between 1979-85.

Earlier Hoechst had written to the ministry of chemicals and petrochemicals to review its claims. Since the ministry has not responded to the letters, the company has been forced to take the matter to court.

The court has postponed the hearing for the case to September 26, Mr. Jain said.

Glaxo India Limited filed a similar case against the government in July. It claims that the ministry must pay Rs. 37 crore as compensation for unintended losses during 1981-87.

The amount, Glaxo appealed, should be set off against the government's claim of Rs. 66.35 crore against the company. The demand notice for Glaxo was issued on June 26. Another multinational, Cyanamid India Limited has been served with notices for Rs. 5.37 crore. It has not yet appealed against the government order.

Meanwhile the minister for petroleum and chemicals, Mr. M.S. Gurupadaswamy assured the Lok Sabha on Sep 4th, that the government would take all steps to recover the amount due under the DPEA.

The government has issued notices for nearly Rs. 176 crore to the drug firms under the Drug Price Control

Order (DPCO) 1979. Under the DPCO 1987, the ministry abolished DPEA payments. However, it retains the right to recover amounts due for the period 1980-87.

At an earlier meeting with drug controllers on July 26, Mr. Gurupadaswamy indicated that the government may recover the amounts through drastic measures. He plans to confer additional powers to the controllers to ensure the recovery of arrears.

The industry has indicated several set-offs to the amounts calculated by the government as unintended profits. The joint council of pharmaceutical industry and trade had put this forward as one of its demands to the ministry.

The council consists of Organisation of Pharmaceutical Producers of India (OPPI), Indian Drug Manufacturers Association (IDMA), Pharmaceutical and Allied Manufacturers' Association (PAMDAL), and the All India Organisation of Chemists and Druggists (AICOD).

In claims that government demands for compensation sums are unjustified. Several firms have suffered unintended losses which need to be set off against the arrear claims.

At a press conference last month, the council members claimed that the minister has agreed to consider their demands. At this instance, the council withdrew its call for an all-India bandh of trade and industry.

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### MARINE CHEMICAL COMPLEX AT TUTICORIN PLANNED

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A proposal to develop a marine chemical complex at Tuticorin to utilise profitably the bittern available from the salt factories there is engaging the attention of the Tamil Nadu government.

The idea is to promote a group of

units, both medium and small in the complex, with processing facilities to extract valuable chemicals like magnesium sulphate, magnesium chloride and potassium chloride from bittern. At present, a large quantity of bittern, which is nothing but the mother liquor left in the beds after the salt is removed, is dumped back into the sea.

According to salt industry experts, for every tonne of salt produced, nearly 0.7 tonne to 0.8 tonne of bittern is available. The State occupies a premier position in salt production with an annual output ranging between 18 and 20 tonnes, next only to Gujarat.

As Tuticorin is the major centre accounting for almost 50 per cent of the total production, it is considered as the most ideal place for the complex.

The other centres are spread over the six coastal districts of South Arcot, Thanjavur, Pudukottai, Ramanathapuram, Chidambaram and Kanyakumari. Although there is plenty of scope for setting up salt-based chemical units in these districts, the potential has remained largely untapped. Apart from a handful of units for making caustic soda and soda ash, there are no sizeable investments.

In the case of exploiting bittern, the situation is even worse. The only initiative in this area, which is worthy of mention is the magnesium metal project at Valinokkam in Ramanathapuram promoted by Tamil Nadu Magnesium and Marine Chemical Ltd.

The bittern from the nearby factory of Tamil Nadu Salt Corporation is put to profitable use there.

Enthused by the success of this venture, the state government is keen to encourage new units in this sector. It is learnt that the idea is being actively sold to industrialists, both in and outside the State. Efforts are on to rope in NRI investments too.



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## RIL, Bombay Dyeing set to hike PTA, DMT prices

Reliance Industries Ltd. and Bombay Dyeing are preparing to hike end-prices of purified terephthalic acid (PTA) and dimethyl terephthalate (DMT), respectively. Reliance, as a prelude to raising prices, has already informed major PTA users about its inability to continue regular supplies.

The hike in the prices of the two petrochemical intermediates is likely to be effected in a month's time. The sole reason for the price increase is the continuing Gulf crisis and hardening international crude prices.

Paraxylene, a vital raw material for both PTA and DMT, has suddenly disappeared from the international market. Wherever it is available, the f.o.b. prices, is higher than what it was one month ago by nearly \$ 300 a tonne. This is the same paraxylene that has been carried over from the second quarter as surplus stocks.

As a result of the uncertainty in the international market over crude prices and supplies, and the attendant fallout on naphtha, paraxylene is suddenly in short-supply. Bombay Dyeing, which purchased 4,000 tonne of paraxylene in June at around \$ 425 on c and f basis, recently entered the market and booked supplies till December at \$ 600.

Bombay Dyeing's basic DMT prices at present work out to Rs. 24,000 per tonne, which is based on the c and f price of around \$ 542. With Bombay Dyeing now paying \$ 600, its DMT prices are also bound to go up. The new basic price for DMT is around Rs. 28,000 per tonne, exclusive of excise and central sales tax.

With the Union government still unable to cope with the mounting need for foreign exchange to import crude, both Reliance and Bombay Dyeing have been asked to import paraxylene

only against Rep licences, Bombay Dyeing bought Rep licences from the open market at a premium to obtain the additional paraxylene.

However, it is not clear why Reliance wants to enter the international markets for paraxylene as it has been insisting all along on stopping imports. Reliance has informed its PTA users that owing to the Gulf problem and the 10 per cent cut on naphtha supplies from domestic producers imposed at the behest of the Union government — the company is facing problems in manufacturing paraxylene and, therefore, PTA.

The PTA supplied by RIL has a basic price tag of Rs. 24,450 per tonne, plus excise and central sales tax. With Bombay Dyeing all set to jack up DMT prices in another month, Reliance might take this opportunity to hike PTA prices also. As it is, the 10 per cent cut on naphtha allocation, based on the average consumption of the last three years, is not likely to affect RIL's production much. However, Reliance feels that the 10 per cent cut will in additional outgo of foreign exchange for import of value-added items.

International prices of paraxylene are hovering around \$ 700 per tonne f.o.b. Ex-Rotterdam. The landed cost works out to around \$ 750. This is almost double the \$ 365 f.o.b. ex-Rotterdam paid by Indian Petrochemicals Corporation in June. Immediately after Iraq attacked Kuwait, prices climbed to \$ 500.

Both IPCL and Bongaigaon refinery are charging a basic price of Rs. 26,000 per tonne for their DMT. It is quite likely that with crude at a premium and naphtha supplies to the IPCL plant greatly reduced, both IPCL and Bongaigaon Refinery will also raise their DMT prices. The Union government, however, has washed its hands of the

entire affair and has asked the major producers to do anything they like, including purchasing REP licences from the open market.

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### ANALISA 90

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ISA International Maharashtra Section has organised a Seminar and Exhibition on Analytical Instrumentation in Process Industries, at HOTEL CENTAUR, BOMBAY AIRPORT on 28th and 29th September, 1990. Chief Guest will be Mr. R.M. Kedia, President Thane Belapur Industries Association. Mr. M.G. Nayak, Dy. Secretary, (Technical Education) Government of Maharashtra has given his consented to be Guest of Honour. Keynote Speaker will be Mr. B.B. Chopane, Director of Technical Education, Maharashtra State.

The seminar timings are from 9 A.M. to 5 P.M. and the Exhibition timings are from 10 A.M. to 7 P.M. on both the days. Topics covered in the seminar the latest developments is (1) Chromatography, (2) Air Monitoring, (3) Water Pollution monitoring, (4) On line analysis, (5) Toxic gas detectors etc.

The exhibition will be open to the public throughout the two days. There will be a stall for small scale manufacturers with special rates and product literature will be freely available.

The seminar will be particularly beneficial to quality Control Chemists, R & D Managers, Production Managers, Instrument Engineers designers, consultants specialists.

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**HDPE, MEG & LAB PROJECTS****Rs. 27-cr bank guarantees sought from RIL, RPL**

The customs department in Bombay has asked Reliance Industries Limited (RIL) and Reliance Petrochemicals Limited (RPL) to give bank guarantees totalling Rs. 27 crore for three of their projects.

The projects for which the bank guarantees have been asked are: high density polyethylene (HDPE), mono ethylene glycol (MEG), (both of RPL) and linear alkyl benzene (LAB) of RIL. While for the HDPE project bank guarantee is asked to the tune of Rs. 20 crore, for the MEG it is Rs. 2.5 crore and for the LAB project it is Rs. four crore.

Besides the guarantee customs has also asked RIL and RPL for a provisional duty bond (P.D. bond) and import trade control (ITC) bond. In the case of the HDPE project the P.D. bond asked for was to the tune of Rs. 137 as also the ITC bond. In the case of the MEG project P.D. bond asked was Rs. 58 crore while there was no ITC bond. In the LAB project Rs. 30 crore was asked as P.D. bond and Rs. 17 crore was asked as the ITC bond.

The bank guarantees come in the wake of certain imports by the Reliance group which created some doubts among the customs officials. In the case of the MEG project at Hazira, near Surat, officials came to know that in 1985 Reliance had come to an agreement with Chemtex of Japan for the supply of an MEG plant with a capacity of 40,000 mta which totalled a cost of Rs. 37.5 crore and know-how fees to the tune of Rs. 4.10 crore.

But Reliance got into an agreement with Lummus Crest, Netherlands, for the supply of an MEG plant of 60,000 mta for nitrogen ballast and a capacity of 80,000 MTA methane ballast. Reliance declared the price to customs as

similar to that of the plant they were earlier negotiating with Chemtex, Japan. This was despite the fact that capacity had risen by 50 per cent. The only difference in payment was that in case of Lummus Crest the know-how fees had jumped to about \$ 3.6 million.

Customs pointed out that the higher capacity plant should cost higher as per international norms. Besides, the know-how fees had been hiked indicating that the capacity too must have been enlarged. Reliance explained that in the deal with Chemtex, the MEG plant to be acquired was of 60,000 mta which was to be scaled down to 40,000 mta and this would result in saving in equipment cost. Despite these objections, the contract was allowed to be registered provisionally after some provisional value addition. Plant and machinery imported in this case was cleared after filing the bonds and the bank guarantee.

For the MEG plant, customs had asked for a Rs. 50 lakhs cash deposit which Reliance pleaded it was unable to furnish and instead a bank guarantee was taken. In the case of the HDPE project, also situated at Hazira, the company applied in 1989 for registration of a contract for plant capacity of 50,000 mta. The suppliers were once again Lummus Crest and technology was from Du Pont, USA.

Initial scrutiny of the documents showed prima facie evidence that capacity of the HDPE plant would be 1.2 lakh mta instead of 50,000 mta. Custom further observed that while Reliance had an industrial licence for HDPE, it could along with Du Pont's "swing technology" produce low density polyethylene (LDPE).

Thus customs provisionally registered the contract and charged the due pay-

ment of the two bonds and the bank guarantee. It is learnt that Reliance is trying for DGTD permission for a one lakh mta HDPE plant. In the linear alkyl benzene (LAB) plant at Patalganga, Maharashtra, there were to be two phases to the plant. In the first phase, paraffin was to be manufactured from the raw material kerosene. In the second phase, LAB was to be manufactured from raw material paraffin. Thus when the two plants were integrated, the raw material would be kerosene and end product LAB, while the intermediate product would be paraffin.

Again customs officials, suspect that phase-two, which has been installed before the phase-one was of a much higher capacity than the declared 50,000 mta. On the basis of serious production data available on different documents relating to phase-two, customs feel that the capacity of the phase-one plant will be higher. In this case too, provisional registration of the contract has been offered.

Customs have launched a thorough investigation into the three projects. As in the case of the purified terephthalic acid (PTA) plant investigations, customs is expected to take proper action after the plants are completed and importation complete.

It may be recalled that the customs department had issued a show cause notice to RIL in 1987 for allegedly evading Rs. 120 crore worth of duty by wrongly declaring the capacity of the polyester filament yarn (PFY) plant by bringing in 12 spinning machines instead of the permitted eight.

In 1990 customs issued another show cause notice for wrong declarations of the capacity of the PTA plant and duty evasion thereby to the tune of Rs. 174 crore. In the PFY case Delhi High Court has adjourned the proceedings till March 1991 and in the PTA case the RIL has yet to file its reply to the show cause notice.

## SPIC to modernise fertiliser plant

The Southern Petrochemical Industries Corporation Limited's (SPIC) programme of modernisation of its fertiliser project at Spic Nagar in the port town of Tuticorin was inaugurated on Aug 31st by Mr. M. Karunanidhi, Chief Minister of Tamil Nadu.

The Rs. 160-crore scheme is aimed at modernising plants that have been in operation for the last 15 years. The present modernisation is expected to extend plant life by another 15 years.

A major feature of modernisation is the addition of a 10,000 tonne ammonia storage facility costing Rs. 13 crores. This will facilitate a thorough inspection of the existing tank which is a safety requirement and will also lend stability to the existing operations. The upgradation schemes in ammonia, urea and utility plants will cost about Rs. 121 crores and this will include schemes for replacement of major equipment, adoption of the latest concepts in a few sections of the plants and the conversion of pneumatic control systems into state of the art distributed digital control system. A Rs. 11 crore conversion of the existing sulphuric acid plant into double contact double absorption system will ensure much less emission and also improve the efficiency of the process.

For the second line SPIC is going to set up pipe reactor technology. This was pioneered by the company in the country and the second project will cost Rs. 15 crores. This will increase the production capacity by at least 30 per cent in addition to reducing the energy consumption levels.

### REICHHOLD CHEMICALS INDIA: CENTRE ALLOWS 40 pc STAKE TO ITALIAN CO

The Union Government has okayed the purchase of 40 per cent stake in Reichhold Chemicals India Ltd., a Madras-based sick company, by Mon-

tedipe of Italy.

Montedipe, belonging to Enimont group of companies, has bought the equity from an Indian who is now an American citizen. The remaining 60 per cent equity has been picked up by UB group, Montedipe's Indian associates. Promoted originally by the Amalgamation group, Reichhold manufactures unsaturated polyester and phenolic resins. Under UB management, the company claims to have improved its performance and is close to breaking even.

With Montedipe's backing, Reichhold now plans to venture into new areas. The company has received a letter of intent to manufacture 2,000 tonnes of polyurethane surfactants. As for polyols, UB has systems. This is part of the UB group's plan to diversify into the entire range of polyurethane chemicals.

### BENGAL DRUG MAKERS FOR 'SINGLE WINDOWS'

The West Bengal Small Scale Drug Manufacturers and Traders' Association has called for opening of single windows at SSI where all information regarding a small unit would be available, so that government inspectors would not have to visit the units every now and then. Interestingly, the association has demanded that self-employment schemes be legalised for SSI units in respect of marketing for job creation and opening up of rural markets for manufacturing SSI units. It has also pleaded for total exemption of all small scale drug formulation units from the drug price control order (DPCO) as they lack the resources and expertise to tackle the formalities relating to DPCO. For determination of small scale status, the association has demanded an upward revision of the turnover ceiling to Rs. ten crores at current market prices.

As far as excise is concerned, the association has demanded upward revi-

sion of the exemption limit to Rs. one crore and slabwise benefit to Rs. five crores. Filing of gate passes should also be restricted to once a month instead of the present system of thrice a month.

The association has welcomed the move by the minister of state for small-scale, agro and rural industries Mr. Srikanth Jena to constitute a committee to simplify procedures relating to small industry through reduction in paperwork, number of returns and visits by government inspectors.

### SHRI M.S. GURUPADASWAMY TO INAUGURATE ICMA AGM

The Fiftieth Annual General Meeting of the Indian Chemical Manufacturers Association (ICMA) will be held at Calcutta on Saturday, the 22nd September 1990. Shri M.S. Gurupadaswamy, Union Minister for Petroleum & Chemicals will inaugurate the function and give away the ICMA Awards for 1989. The ICMA, for the first time, has instituted a Special Award for Individual for outstanding contribution to the Chemical Industry and the same will be presented to Prof. M.M. Sharma, FRS, Director, Department of Chemical Technology, University of Bombay, on this occasion.

### N-POWER UNIT SAFE

The Tamil Nadu chief Minister, Mr. M. Karunanidhi, has allayed fears about the environmental hazards in the wake of the proposed atomic power station at Koodangulam in the Nellai Kattabomman district of the state. Laying the stone for the Rs. 160-crore joint sector-SPIC modernisation project on September 8th the chief minister said, adequate preventive and precautionary steps would be taken to ensure that the water supply and irrigation in the area was not affected. Pointing out that the state government had allotted Rs. 450 crores for power generation, he claimed that Tamil Nadu at present was the only state without any power cut.

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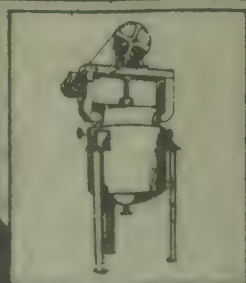
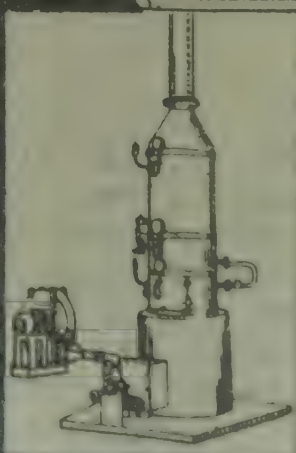
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## BABRALA FERTILISER PROJECT

## Tatas offer to refund money

In a precedent setting move, Tata Chemicals has offered to return the money to be collected from the public for its proposed fertiliser plant at Babrala, if it fails to implement the project. The company plans to mobilise Rs. 400 crores worth of rights and public issues of partly convertible debentures for a total face value of Rs. 400.37 crores.

According to corporate circles in Delhi, it is the first time that a company is offering to return the money in case of non-implementation of a project. There are "very few" instances where companies have returned money to investors. The company law procedure for return of public money is complicated as it involves cutting down the equity base of a company.

ified after a public issue, but funds are rarely returned. Mr. Darbari Seth, chairman and managing director, said that the offer to return the money has nothing to do with the controversy over supply of gas to his fertiliser unit. Mr. Seth along with Mr. K.K. Birla refused to sign a gas supply contract with the Gas Authority of India Ltd. (GAIL) on the grounds that the contract was unfair and patently biased.

Eventually, a restraint order had to be obtained from the Delhi high court in the face of a deadline from the Union government that the gas allocation to the two units will be cancelled if they do not sign the contract. There were also reports that the government was even thinking of cancelling the letters of intent for the project.

Projects are often substantially mod-

Mr. Seth stated that he would not

back out of the fertiliser project. "We have categorically stated that we shall sign a judicially determined, fair and reasonable gas supply contract". According to Mr. Seth, the money will be mobilised explicitly for the fertiliser project and to lend credence to this claim, Tata Chemicals has decided to return the money if the project is not up. "We believe in certain values and would not like to follow the examples of those who mobilise money for one project but end up using it for something else". He said that he believes in innovative ideas. "The open offer for Consolidated Coffee Ltd., (CCL) shares is an example", Mr. Seth stated.

In an innovative takeover bid, Mr. Seth had offered CCL shareholders one Tata Tea share at Rs. 100 in cash for every two shares of CCL. The offer received an overwhelming response from CCL shareholders.

Mr. Seth admitted that the project's implementation had been delayed but said that this had been for reasons over which they have no control. "During the two years from June 1988 to June 1990, our project cost increased from Rs. 765 crore to Rs. 980 crores", he said.

"The new gas-based fertiliser projects cannot be blamed for the flaring of associated gas. The gas that is being flared would not have diminished even if all the gas-based fertiliser plants were in operation today because the volume of associated gas vastly increased on account of over-exploitation of the country's limited oil reserves.

The lack of means (and will) to gather and use this gas and the fact that GAIL could now have supplied to the fertiliser plants would have been only the free gas from Bassein", Mr. Seth said.

Mr. Seth had proposed the issue in October last year. But because of the change in government, the consent was delayed.

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## Industry-research units interaction vital

The President, Mr. R. Venkataraman, has called for greater interaction between industry and research institutions in the interest of economic development of the country.

Speaking at the silver jubilee celebrations of the Birla Institute of Technology and Science (BITS) on Sept. 9th the President regretted the 'woefully inadequate' linkage between the universities and technology institutions on the one hand and the industry on the other.

Massive investments made in research laboratories and technical institutions would be 'wasted' unless industry referred its problems to them for a solution and had an interaction. Mr. Venkataraman said the urge to cut costs, improve productivity and quality was missing in entrepreneurs since they have lived in a sheltered sellers' market, without either internal or external competition. As a result, the painstaking

work in the universities and laboratories had remained largely dormant, not finding application in the production of goods and services.

'This phenomenon has also led to a sense of frustration among research scientists who feel the results of their research are ignored by industry', the President said.

Industry has also done little by way of promoting in-house research and development activities.

Stating that there was no limit to the possibilities of invention and adaptation of science for human welfare, Mr. Venkataraman exhorted the youth to rebel against the status quo and meek acceptance of existing conditions. 'They should aspire to become Faradays, Edisons and Marconis and so on'.

Mr. Venkataraman also called for

harnessing science and technology for human development and application to day to day problems.

Referring to technology imports, he said, 'the habit of looking for assistance from abroad has not left us'. Constant and continuous import of technology had impeded the country's scientific development, the President said.

Though import of the latest technology was unavoidable, it was important to acquire them and make suitable innovations so that the country was not obliged to import every later development on the imported technology.

Mr. Venkataraman referred to the country's success in agricultural production which had evoked the admiration of many developing and even developed countries. He also inaugurated the centre for research on education, innovation and institutional development located at the BITS complex.

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## ONGC slashes crude production

The Oil and Natural Gas Commission (ONGC) has been forced to slash its crude-production target for the current year by between 500,000 to 700,000 tonnes.

This comes when the government is facing an unprecedented foreign exchange crisis, forcing it to slash import of crude and petroleum products from the international market.

The ONGC had originally set a target of 33 million tonnes of crude in 1990-91. According to official sources, the ONGC has informed the ministry of petroleum and chemicals that it would not be able to produce more than 32.3 million tonnes because of factors beyond ONGC's control.

Oil industry circles say the original target was below the ONGC's production capacity. The optimal utilisation of capacity has been made impossible by the "wrong priorities" of the government.

The government has sunk considerable capital into creating production facilities in south Bassein, the largest gas field, and the HBJ gas pipeline, which remain underutilised. Had the government spent a few hundred crores in the North East and Gujarat to create additional refinery and crude transportation facilities, the ONGC would have been able to produce more crude from these areas.

In fact, it had set a target of 4.1 million tonnes of crude from Assam last year, but was forced to reduce the target to 3.1 million tonnes on account of "refinery constraints".

In Gujarat, the ONGC has been asked to restrict its production as the existing refinery cannot process all the crude. The Koyali refinery of IOC cannot process more than 4.7 million tonnes of north Gujarat crude and there are no transportation facilities for the surplus

south Gujarat crude. The surplus crude in Gujarat is estimated at 1.05 million tonnes in 1990-91, which will rise to 3.6 million tonnes in 1994-95. The ONGC will have to restrict its production from north and south Gujarat till the government decides to set up additional refining capacity.

The present crisis is on account of low sulphur heavy stock (LSHS) piling up at Koyali refinery. According to the IOC, the offtake of LSHS has come down from 7500 tonnes a day to 6000 tonnes a day. This has forced the IOC to reduce the intake of crude from north Gujarat, which has high LSHS content. This in turn, made the ONGC cut back production by 0.12 million tonnes in the first quarter of the current year. A total shortfall of 0.5 to 0.6 million tonnes is expected from Gujarat during the year.

In Assam, the recent oil blockade and frequent bandhs have played havoc with the ONGC's production programme. The ONGC has told the government that there would be a production shortfall of 0.16 million tonnes from Assam this year. Meanwhile the Committee on Public Undertakings (COPU) has charged the Oil and Natural Gas Commission (ONGC) with lack of proper planning and co-ordination on its part in the construction and utilisation of two platforms, which resulted in drainage of foreign exchange of Rs. 22.55 crore and loss of additional production valued at \$42.24 million.

### ONGC FLAYED FOR EXCHANGE DRAIN

The public undertakings committee has charged the Oil and Natural Gas Commission with "lack of proper planning and coordination" in the construction and utilisation of two platforms, which resulted in drainage of foreign exchange worth Rs. 22.55 crore and loss of production worth \$ 42.24 million. The committee has said fabrication of platforms NR-1 and NH for

Bombay High was to start from, November 1, 1983, and May 1, 1984, respectively as part of the accelerated production of 63.14 million tonnes of oil. But this was subsequently modified to produce an additional 1.32 million barrels of oil and the platforms were required to be completed before the monsoon of 1983 as per modified plan.

The contract of fabrication and installation of the platforms was awarded to Mazagon dock and after it informed ONGC that it could complete the work only by October/November 1983, the corporation called the tenders in May, 1982, for completion of the work by April 30, 1983.

Since there were no bidders, a revised tender was floated and the contract was finally awarded in September, 1982 at the revised price of \$ 23.388 million (about Rs. 22.52 crore) for completion of the platforms by May 7, 1983, in order to have four months earlier production equivalent to 1.32 million barrels. Despite the fact that work on both platforms was actually completed as per schedule, ONGC could take up drilling on the NH platform only in May 1984, and on NR-1 in November, 1984. Thus the whole purpose of spending an enormous amount of foreign exchange was lost since Mazagon Dock had offered to finish the job in October/November 1983 itself, the report said.

The report also rapped ONGC for the delay in starting production on NH and NR-1 platforms and for its false claim that this was due to non-availability of rigs as the Sagar Vikas rig had blown out. It said that at the time of awarding the contract, ONGC was fully aware of the shortage of one rig and the eventual consequences. The commission however, persisted with the approach of having these platforms completed before the monsoon of 1983, "without making any serious efforts for acquiring an additional rig in place of Sagar Vikas and remained sitting on the false hope of recommissioning of this rig".

## Gujarat backs Rs. 1,900 crore export oriented oil refinery proposal

A 100 per cent, export-oriented oil refinery has been mooted by the Gujarat state government to earn foreign exchange of an estimated Rs. 7,000 crores in the next ten years. The proposed refinery, to be set up at Vadinar port on the Saurashtra coast, is expected to cost more than Rs. 1,900 crores. It will have a capacity of 9 million tonnes per annum and will have a tie-up with Bechtel Inc., USA.

Initially, the project was envisaged by the Essar Group, having expertise in gas exploration, off-shore oil and shipping, but the state government has suggested to the Centre that it will have an equity participation and the project can be set up as a joint venture. The project has been submitted by the Chief Minister, Mr. Chimanbhai Patel to the Prime Minister, Mr. V.P. Singh, for early clearance by the Centre so that other formalities can be expedited.

The project, which will involve an estimated foreign exchange of Rs. 700 crores, is expected to be completed in 36 months. Against this, the refinery is expected to earn foreign exchange worth Rs. 3,000 crores in the first five years and another Rs. 4,000 crores between the sixth and tenth year.

In his personal discussion with the Prime Minister in Delhi, the Chief Minister has pointed out that the state government has not only accorded highest priority to the project but has also submitted a proposal to the ministry of petroleum and chemicals and the commerce ministry for early approval. At present, the proposal is to be considered by the special board under the ministry of commerce.

The project envisages import of crude oil from Gulf countries and export of processed products to both eastern and western countries. In his note to Mr. Singh, the Chief Minister has pointed

out that the sponsor of the project have been able to obtain support from international companies like Aramco, Saudi Arabian Marketing and Refining Co., British Petroleum and Caltex for the supply of crude oil.

Describing the projects as "extremely attractive" in terms of foreign exchange earnings, the Chief Minister pointed out that the setting up of the refinery on the Saurashtra coast would open up many opportunities. It will not only provide employment to skilled and semi-skilled people but also open the doors for ancillary industries to supply various spare parts and components required in the refinery, he added.

Moreover, the note submitted by the Chief Minister also points out that the shipping industry will get a big boost by transporting the crude oil, almost 9 million tonnes per year in the country as well as exporting the end products. At the same time, it will also help transport in Saurashtra and will provide employment which will arise due to the development of a new harbour at Vadinar.

Explaining the financial viability of the project, the note said that the foreign exchange of Rs. 500 crores would be required during the construction phase and another Rs. 200 crores in the first year of operating phase. But the refinery will start earning foreign exchange of Rs. 792 crores from the third year of its operation.

In subsequent years, it will earn foreign exchange of Rs. 810 crores and Rs. 814 crores. During the sixth and tenth years of its commissioning, the refinery is estimated to earn Rs. 4,000 crores. During his recent visit to the USA and the UK the chief secretary, Mr. H.K. Khan, held discussions with NRI's for their equity participation. According to a rough estimate, NRIs

may invest around Rs. 70 crores in the project.

The Chief Minister's note said that the demand picture in the Asia-Pacific region would be around 3.5 million barrels per day as against the production growth of only one million barrels per day. This gap could partially be filled by the Vadinar refinery.

The Chief Minister wanted Mr. Singh to expedite the process of clearance of the project so that escalation of cost could be minimised.

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### CRUDE OIL PRICE UP 50% IN A MONTH

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In the one month of the Gulf crisis the price of crude oil in the international market has risen by a clear 50 per cent over the price that was prevailing prior to the Iraqi invasion of Kuwait.

On the evening of August 1 the price of oil in the major markets closed at \$ 18 a barrel and when oil markets closed on Friday, August 31 the price of oil had escalated to \$ 27 and 60 cents a barrel with oil industry analysts saying that the price would soon surpass the \$ 30 a barrel level.

The past month of the Gulf crisis saw the price of oil fluctuate from day to day in direct correlation to the military tensions in the Gulf. As the fear of war heightened in the first half of August, oil prices broke all records of the past 10 years and started to edge up to the \$ 40 a barrel mark.

This steep climb was corrected by an OPEC decision in the last week of August to increase production by 4 million barrels a day. On August 29 oil prices fell by \$ 2 and 30 cents a barrel.

But then again as uncertainty loomed large over the Gulf the market closed on Friday, August 31 up by \$1 and sixty cents a barrel to close at \$ 27 and 60 cents.

## USSR oil exports face hitches

The Soviet Union, hungry for hard currency, is reaping a windfall from higher oil prices and would like to increase exports to take advantage of shortages caused by the West Asia crisis, but it can't. The problem is an antiquated and long mismanaged Soviet petroleum industry unable to boost production. It may yield 500,000 fewer barrels a day this year than last, western analysis say.

The Soviet Union produced about 12.1 million barrels of oil a day last year, a sixth of the world's total and more than Saudi Arabia, Iraq and Kuwait combined. It exported 3.7 million barrels a day — more than Iraq — with about half going to the west.

"They are producing at maximum capacity and their production is declining. There's no way they can get increased production, said John Lichtblau, chairman of the Petroleum Indus-

try Research Foundation.

Not only is the Soviet industry unable to boost production, its problems with nuclear reactors have added to the domestic demand. The Soviet Union's appetite for oil is second only to the United States.

Deliveries of bargain-rate Soviet oil supplies to Cuba, averaging about 90 million barrels annually, already are being reduced. U.S. Experts acknowledge that the Soviets are expected to gain hundreds of millions of dollar in additional hard currency in the coming months if the higher oil prices stand.

### NOCIL'S THANE PLANT SHUT DOWN

The Thane plant of National Organic Chemical Industries Ltd. (NOCIL), has been shut down following the breakdown of the compressor on August 28.

The company is procuring spare parts and expects to commission the plant within a fortnight. The cause of the compressor failure is being investigated. Much of the plant equipment is very old. The compressor, for example, has been in operation for 29 years and has never failed in the past.

### GILLANDERS PLANS TO DIVERSIFY

Gillanders Arbuthnot and Company will diversify its activities and is most likely to invest in textiles and petrochemicals. The company has appointed consultants to short-list 10 sectors and prepare feasibility reports.

The company will select two or three fields for investment. Most of the new units will be set up in West Bengal and Assam. At the annual general meeting in Calcutta, recently the shareholders passed a special resolution on the company's diversification plan.

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## SLIPPAGE IN START-UP SCHEDULE

**Reliance Petro needs Rs. 750 cr. more**

Reliance Petrochemicals wants to take a set of radical steps at its annual general meeting to be held on September 27. The meeting is of extraordinary significance.

But not many shareholders will be around to attend it. It is planned to be held in the small town of Nanpura, which lies in the Surat district of Gujarat.

One of the several crucial moves RPL will be making at the AGM is to go for a huge borrowing — of Rs. 750 crores. As per Resolution six of the AGM notice, the company wants to be empowered to borrow Rs. 750 crores through debentures, term loans, leasing, asset credit schemes and other means.

And why does RPL need so much of additional money? Because its project to produce three petrochemical products (MEG, PVC and HDPE) have overshot the original estimates.

Exactly two years ago, RPL had raised about Rs. 600 crores from the stockmarket to finance this project. That itself was way above the original cost of around Rs. 350 crores.

According to its earlier claims it is supposed to be close to commissioning the project by now. Strangely, it actually needs additional funding of Rs. 750 crores.

It has sought to justify this by arguing that the MEG capacity now as per government's order of minimum economic size will be 100,000 tonnes in place of 60,000 tonnes and HDPE capacity will be 100,000 tonnes in place of the 50,000 tonnes planned earlier.

Besides, the company is constructing a "captive gas-based power plant and a jetty for handling ethylene and other products," says the explanatory state-

ment to the notice.

However, it does not provide any clue to how much of the cost increase is due to the power plant, captive jetty and the capacity increases of the three plants.

According to various industry sources, RPL's requirement of power should not be more than 40 mega watts. A gas-based plant of that size should cost around Rs. 50 crores. An ethylene-handling jetty could cost up to Rs. 30 crores or so. This means that over Rs. 650 crores is being spent simply to hike the capacities of the MEG and HDPE plants.

Sources in the petrochemical industry are intrigued by this huge expenditure. Finolex Pipes, which will go into production two years later, is planning a project to produce 20 MW of power, 100,000 tonnes of PVC and the required caustic/chlorine (included in RPL's project too) — all for just Rs. 352 crores. Included too, is a jetty to handle imported ethylene or ethylene dichloride.

Interestingly, contrary to what the company had claimed earlier, the project is going to suffer a huge time overrun. This is crucial because in the past Reliance group has consistently claimed credit for having implemented projects well within schedules. The company was supposed to be starting its project by now — 24 months after it raised money. The RPL annual report has Mr. Dhirubhai Ambani telling shareholders that the plant to make MEG will be commissioned only by the first quarter of 1991.

And the plants to make PVC and HDPE will be only "mechanically completed" in the first quarter of 1991. Significantly, the additional spending for the project has got the nod from financial institutions led by the Indu-

strial Credit and Investment Corporation of India (ICICI).

In an interesting move, RPL is asking shareholders to pass a resolution to enable the board of directors to make charitable contribution or donation.

It wants to give away money for funds "not directly relating to the business of the company or to the welfare of its employees". The amount it wants to spend can go up to 5 per cent of the company average net profits for the previous three years.

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**OIL PRICE RISE MAY HIT POOR NATIONS**


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The industrial countries are better placed to deal with the increase in oil price in the wake of the Gulf crisis but the majority of developing nations are less well positioned.

According to a preliminary World Bank study developing countries will find it difficult to raise the additional resources to meet the higher cost of oil imports and larger interest payments on their variable rate external debts.

Commercial banks are reluctant to increase their exposure to heavily-indebted nations and many of the poorer developing countries will find it difficult to gain access to international financial markets. The burden of economic adjustment will, therefore, have to fall on domestic policy measures, with serious consequences for growth and development the study adds.

Compared to 1973 and 1979, the World Bank study points out, the oil price increase is likely to be modest.

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**NALCO EXPORTS**


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National Aluminium Company Ltd. (NALCO) achieved a major milestone last month-end when the company's alumina exports crossed one million tonne mark since 1988.

## Proposal to raise refining capacity

The Petroleum Minister, Mr. M.S. Gurupadaswamy, told the Lok Sabha recently that it was not possible to estimate precisely the additional expenditure likely to be incurred in the current year on oil imports due to oil price increase.

This was because of the prevailing volatile price situation and uncertainty regarding supply, Mr. Gurupadaswamy told Dr. K.P. Bopche and Mr. Babanrao Dhakne in a written reply. He said measures were being taken to achieve economy in expenditure involving foreign exchange, restrict imports and increase exports, contain demand of petroleum products to reasonable levels besides accelerating disbursement of external assistance.

He said there are proposals for increasing the refining capacity through debottlenecking of existing refineries and also for setting up of new grassroots refineries. It is also proposed to augment the motor spirit production at the existing refineries by installing reformers and debottlenecking of existing fluid catalytic crackers. Some of the proposals for new refineries include facilities for producing motor spirit.

### Petrol consumption

During 1989-90, petroleum consumption was 3.4 million tonnes and consumption of all petroleum products was 5.3 million tonnes, Mr. Gurupadaswamy told Mr. K.D. Sultanpuri in a written reply. He said it was estimated that a saving of about 1.8 million tonnes of petroleum products could be achieved during July 1990 to March 1991 through measures announced on June 21 this year.

The petrochemical complex near Hazira in Gujarat, though considered as a joint venture between the Centre and the Gujarat Government did not materialise due to resource constraints the Minister told Mr. C.D. Gamit.

ernment to expand the Madras Refineries. However, it is currently increasing its capacity from 5.6 mtpa to 6.5 mtpa. The scheme is likely to be completed within the first quarter of 1992 at a cost of Rs. 119 crores.

ONGC has converted gasoline and diesel vehicles to run them using compressed natural gas (CNG) with the help of imported kits, Mr. Gurupadaswamy told Mr. Bhababu Shankar Hota in a written reply. Some buses of Gujarat State Road Transport Corporation had also been converted to run on CNG.

### Conservation Act

The Government has no proposal to bring an energy conservation Act to bring down the consumption of petrol products in transport, the Minister told Mr. Santosh Kumar Gangwar and Mr. B.N. Reddy in a written reply. A letter of intent has been issued to IPCL for setting up a gas cracker complex with its downstream units at Gandhar in Gujarat, he told Mrs. Basava Rajeshwari.

### NEW CHEAPER PETROL SUBSTITUTE

Two young men at Rajkot have claimed to have found an alternative to petrol which is cheaper by 50 per cent and has the capacity to give more than double the average fuel efficiency for two-wheelers. Demonstrating their invention at a press conference, Mr. Ramesh Gajjar, one of the two researchers, told newsmen that it is the liquid formation of a chemical compound available in abundance all over the country. The alternative compound costs about Rs. 5 a litre and can fuel a 100 cc motorcycle to 175 km as against about 70 km in the case of petrol, Mr. Gajjar said. The alternative fuel has been successfully tried on all kinds of two-wheelers with wonderful results. A 50 cc moped can go 350 km with just one litre of the wonder liquid, he said.

The new fuel is smokeless and does

not create any pollution hazards, he claimed. To use it, minor alterations, costing about Rs. 100 are required in a two-wheeler. To a question, Mr. Gajjar said that he is yet to try his invention on four-wheelers.

A graduate in commerce, the 32-year-old Mr. Ramesh is a motorcycle mechanic, while his co-researcher, Mr. Detas Bhadresha, is only a matriculate and has some knowledge of chemical science. The duo claimed that they have spent more than four years to achieve the success and they want to keep their formula a closely-guarded secret till some big business house or the government recognises their achievement. The new fuel was tested in the presence of journalists at a social service club and two of the reporters had a joy ride on a motorcycle powered by the new fuel.

### NEW PUBLICATION FROM CFTRI

The Central Food Technological Research Institute, Mysore has just brought out the revised and enlarged edition of the booklet on "Home-Scale Processing and Preservation of Fruits & Vegetables". Aimed at creating an awareness on the application of modern methods of preparing juice/squash/nectar, canning, drying/dehydration and fermentation at home level, the booklet is expected to be very useful for catering/home-science institutions, hotels, small-scale industries, extension workers, cooperative bodies and housewives. The book gives the broad principles of fruit and vegetable preservation and also the general guidelines for preparation of various products including certain specialised items. Usefulness of the book is enhanced by the inclusion of addresses of manufacturers of equipments useful for home-scale processing. (Pages 76; Price Rs. 15/- + Packing & Postage Rs. 8/- by Regd. Book-post). Copies are available from the Sales & Distribution Officer, CFTRI, Mysore-570 013.

There is no proposal before the Gov-

## Pleas to reconsider petrol use curbs

The Associated Chambers of Commerce and Industry (Assocham) has urged the Government to reconsider its recently announced measures to curb the consumption of petroleum products and to take a decision on a case-to-case basis rather than taking it across the board.

A statement from the chamber said that this was necessary to ensure that the non availability or shortage of oil products does not stand in the way of the industrial sector resulting in a greater outflow of foreign exchange than the amount saved by less import of petroleum products.

Recognising the need to reduce the import bill particularly due to the recent spurt in oil prices owing to the developments in the Gulf area recently, the chamber urged the industry to avoid all wastage of energy, exercising utmost economy in its use, evolve a fool-proof accounting and monitoring system, conduct energy audits and deploy energy saving equipment and appliances on a large scale.

The suggestions were contained in a chamber study entitled 'Curbs on consumption of petrol products', which also welcomes the Government's efforts to tap supplies of oil from alternative sources to tide over the crisis.

The study points out that the transport industry is growing in terms of freight, passenger traffic, road length and in number of vehicles. The reduction in the truck load capacity under the Motor Vehicles Act means many more trips requiring more fuel. The 10 per cent cut in the shipping sector will also cause further hardship to the shipping industry and to the exporters.

It said that reduction in the availability of superior kerosene oil (SKO), which is used for the generation of heat for cracking many products, of naphtha — a necessary material for fertiliser and

petrochemical plants and furnace oil and LSHS used by cement factories would only result in import of these items leading to a larger outgo of foreign exchange and also lead to a decline in industrial production.

The Government has also placed restrictions on the release of minor products like benzene, hexane and paraffin wax used in various value added export items. If the chemical industry has to achieve its targeted growth, it would increase the supplies of these products. The restricted availability will hinder the country's export effort to a large extent, the study said.

It said the proposed ban on the supply of LPG to new industrial consumers during the current year will lead to slowing down of the industrial activity in the sectors where its use is of considerable economic relevance. According to the chamber, restrictions on the consumption of petroleum products should be looked into from the point of view of their impact on States and industries. The petroleum products supplement energy requirements in the States which have inadequate electricity generation and coal supply. Again, there are processes in the industrial sector which cannot do without supply of oil products.

### ESSAR REFINERY PROPOSAL MAY STALL RELIANCE PLAN

Bechtel of the US has joined hands with the Essar group to set up an engineering consultancy firm, which will undertake international plant construction contracts. A memorandum of understanding has been signed by the two to set up the joint venture, in which Bechtel will have a 40 per cent equity stake.

Essar has pulled off a coup by also making Bechtel agree to set two export-oriented projects, one of which is a nine-million-tonne oil refinery at

Kodinar in Gujarat. The other is an alumina unit in Orissa. Both are part of the Essar-Bechtel understanding. Bechtel will invest in the equity as well as help raise foreign currency resources for the two projects.

The general impression is that Essar is trying to pull the rug from under Mr. Dhirubhai Ambani's feet. Reliance had placed a six-million-tonne refinery at Jabel Ali in West Asia primarily to cater to petroleum product needs back home.

But the government has been sitting on the proposal and the latest developments in the Gulf make it all the more difficult for it to clear the Reliance project. In the circumstances, it would be inclined to favour the Ruia proposal rather than Ambani's.

Mr. Ravi Ruia, director of the Essar group, said Bechtel was motivated by the desire to make use of the relatively cheap Indian labour which could sharpen its competitive edge in the international market. Bechtel has found that higher manpower cost was pricing it out of the market.

Bechtel employs several Indians but on American wages. By using the joint venture, which will offer engineering services, Bechtel hopes to outbid its competitors. Bechtel's business relation with Essar began when it received the contract for a 100 mw combined cycle power plant at Hazira for the Indian company's export-oriented hot rolled coil project. Mr. Ruia said the Essar-Bechtel refinery proposal would use Indian labour but the plant would be based on state-of-the-art technology and get raw materials at international prices. Bechtel has undertaken to lift 75 per cent of the production. If the government desires to buy the products, instead of importing them, the company will enjoy a freight advantage. The US company is prepared to invest in similar projects identified by a joint Essar-Bechtel team.

-- Financial Express

## DRAFT PAPER ON POLLUTION

**Stiff penalties, audit system proposed**

Stiff penalties for polluting industries and introduction of an environmental audit system have been proposed in a draft policy paper awaiting Cabinet approval.

Prepared by the Environment and Forests Ministry, the policy would give higher priority to anticipatory and preventive measures than to correcting the immediate environmental problems. It seeks to introduce economic instruments to restructure the energy, urban development, tourism, transportation, chemicals, agriculture and particularly small-scale industry sectors through charges.

The policy also seeks 25 per cent reduction in the consumption and use of industrial water, as also cleaning of river systems and promotion of environmentally clean technologies during

the next five years. It aims at regulating the use of non-biodegradable products, developing a preventive framework for carcinogenic chemicals and bioorganisms and control disposal of hazardous wastes.

An official spokesman said the concept of pollution control would evolve from the present narrow focus of regulatory control of pollution to the management of environment resources. The policy would also impose standards restricting land disposal, surface impoundment, storage in tanks, providing for corrective action as well as financial responsibility.

The policy also provides for assessment of the environmental impact of Government projects and projects receiving State subsidies internally by an environmental cell in the concerned

ministry before any decision in principle is made on them.

It also proposes to adopt a code of stewardship with specific goals and operating procedures to strengthen the Centre-State and local co-operation to avoid duplication and increase the effectiveness of efforts. Stringent measures will be provided to regulate industries which use toxic chemicals and generate hazardous wastes. For effective enforcement, continuous monitoring devices are proposed to be made mandatory for large-scale industrial units.

Mandating public involvement in decision making as a means of promoting dialogue, participation and responsible care, particularly in controversial programmes that involve uncertainties and judgement, will be done, the policy paper states. The draft policy also provides for creation of a Central pool of environmental experts and managers for deputation to the States for effective co-ordination and acceleration of environment protection programmes over the entire country. It also provides for incorporation of concepts related to pollution in the engineering curricula and managerial training institutions and grants to students in IITs.

**STC NOT TO IMPORT NATURAL RUBBER**

The State Trading Corporation of India (STC) will not import any natural rubber for the next six months in order to ensure remunerative prices to rubber growers in the country, official sources said recently. The directive to STC was issued by the Union Commerce Minister, Mr. Arun Nehru, at a review meeting on rubber, they said.

The sources said that Mr. Nehru reiterated the National Front Government's commitment to give remunerative prices to rubber growers in the country and said that all factors would be taken into account while formulating and revising the policy on rubber.

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## World Bank help in effluent treatment

Under a World Bank-assisted project, a Rs. 30 crore incineration plant and a Rs. 1 crore effluent treatment unit will shortly be set up at the MIDC industrial estate in Thane-Belapur for the common treatment of hazardous wastes generated by industries in the area. Another Rs. 10 crore effluent treatment plant is planned for waste generated at the MIDC estate in Dombivli.

According to state environment secretary, Mr. U. Mukhopadhyaya, the preliminary report for the plants in the Thane-Belapur area are ready and will be taken up for further discussion at a high-level meeting with the Central Government and World Bank officials in New Delhi.

Mr. Mukhopadhyaya said the scheme is part of a larger plan for industrial pollution management being implemented in four states viz. Maharashtra, Tamil Nadu, Gujarat and U.P. and is being undertaken by the World Bank at the request of the Indian government. The special feature of this scheme is that it envisages the treatment of hazardous wastes under a common system, unlike individual treatment being undertaken so far.

While stressing that a final financial package for the scheme has still to be worked out, Mr. Mukhopadhyaya said the World Bank may pay 50 per cent, 40 per cent will be met by the industries, and the remainder by the state and Central governments. Giving details, Mr. Mukhopadhyaya stated that the areas identified in the state for common treatment schemes were the Thane-Belapur and Dombivli industrial areas as well as the industrial estates at Roha and Badlapur.

The schemes will be implemented with the help of the Maharashtra Pollution Control Board, the Maharashtra Industrial Development Corporation and the state government. He said the Thane-Belapur Industries Association

has taken the lead and come forward to support the incineration project.

The association will float a company to run the incineration plant which will be modelled on lines similar to plants already operating in Chicago, Rotterdam and Copenhagen. While the incineration plant will cater to small, medium and large industries, the effluent treatment unit will be built for treatment of wastes from only small units.

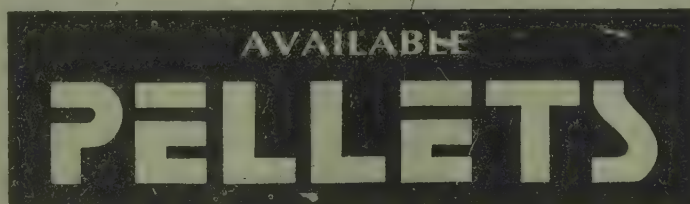
According to Dr. S.L. Patil, secretary, Thane-Belapur Industries Association the project cost for the incinerator is Rs. 30 crore, however they have been given assurances by World Bank officials that they could opt for larger projects even up to 70 crores with aid from the bank. The present model for the incineration plant would serve the 1,180 units in the MIDC estate and have a capacity of 150 tonnes of waste slurry a day. The effluent treatment plant will serve the small

industries who would have to undertake primary treatment at the plant level itself.

The idea for common treatment of industrial wastes was first conceived by the Maharashtra Pollution Control Board several years ago, according to board chairman Mr. C.D. Oommachen.

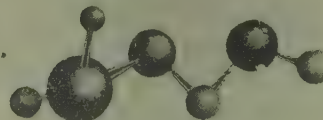
They approached the World Bank for help and it was only after several years of discussion and survey work that the World Bank finally decided to push the schemes through.

This method of common treatment will be taken up by the World Bank in other developing countries also. Mr. Oomachen said he also had plans to obtain World Bank assistance for the waste treatment plants being put up by the various municipal bodies in the state. Regarding the running of the other plants envisaged in the common treatment scheme, Mr. Oomachen said that



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things have not been finalised. Several questions arise, he said, "Who will run it? Who will ensure the profits? Some plants might be run on a cooperative basis while others might be separate companies". A final decision would be taken only after all these issues had been resolved, he said.

### OZONE LAYER DESTRUCTION 'SPREADING SOUTH'

Destruction of the protective ozone layer in the earth's upper atmosphere will affect the northern hemisphere as far south as the Mediterranean within the next 10 years, Mr. Joe Farman, the scientist who discovered the Antarctic "ozone hole", warned recently.

Mr. Farman, an atmospheric scientist with the British Antarctic Survey, predicted that levels of harmful ultraviolet (UV-B) radiation reaching the ground could increase by up to 40 per cent "for short periods" during late

winter and early spring, at latitudes as far south as Greece and Turkey.

The most immediate effect would be to expose early season sunbathers to an increased risk of skin cancer. Speaking at the annual meeting of the British Association for the Advancement of Science in Swansea, Wales, Mr. Farman said the Antarctic ozone hole which appeared during the early 1980s was now about as "deep" as it could become during its seasonal appearance in the Antarctic spring. For practical purposes, almost all the ozone over Antarctica was destroyed then.

Ozone is removed from the upper atmosphere by chemical chain reactions started by man-made chlorine and bromine compounds. The main ones responsible are chlorofluoro-carbons (CFCs) used in many products including aerosols, cleaning fluids and foam plastics, and halons used in fire extinguishers.

Now that Antarctic ozone destruction has reached a limit "ozone losses in other regions can be expected to increase rapidly with the growth of chlorine and bromine" in the atmosphere, Mr. Farman said. "The greatest effects may not be seen until 2005".

Chlorine and bromine levels in the lower atmosphere are likely to reach a peak around the year 2000 as production of CFCs and halons is phased out in accordance with the Montreal Protocol. But the chemicals survive so long in the air that their destructive effects will last for many more decades. The Antarctic ozone hole will be around until the year 2070, Mr. Farman predicted.

The outlook for the next 15 years is for the seasonal Arctic ozone hole to become rapidly deeper, he said. The impact will be felt most seriously in North America and Europe where levels of ultraviolet radiation are "about to accelerate" during the late winter and early spring.

To reduce the scale of the problem, Dr. Farman urged governments to phase out ozone-destroying chemicals even faster than they agreed at the Montreal Protocol meeting in London earlier this year. He was particularly concerned about halons — bromine compounds used mainly in fire extinguishers — which have 30 times the ozone-destroying potential of CFCs.

### DGS AND D REGISTRATION

Dr. N.K. Sengupta, secretary to the department of supply has announced that in future DGS and D registration of supplying units will be done at the three regional centres, viz., Madras, Calcutta, and Bombay except for units located in the North which will continue to be registered with DGS and D headquarters in New Delhi.

No units from the South will be required to go to Delhi for registration.

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## 'Energy scenario demands greater attention'

The Energy Minister, Mr. Arif Mohammed Khan, on September 8th warned that the Gulf crisis could precipitate an energy crisis in the country. "Recent developments in the Gulf have projected the energy problem in a sharper focus", Mr. Khan said inaugurating a seminar on "the energy scenario" organised by Financial Express.

As about 45 per cent of the oil requirements are met through imports, the possibility of these imports being affected to some extent cannot be ruled out, he said.

As oil accounts for 24 per cent of the requirements of the country's commercial energy, any distortion in its supply and demand is likely to have serious repercussions on the economy, he said. It is time "we took stock of the overall energy scenario" and the alternatives to

be adopted to improve the energy situation.

Since India has friendly relations with the Gulf countries, the Government is making all efforts to minimise the impact of the Gulf crisis, Mr. Khan said.

Although the country produced 220 million tonnes of coal, 34.7 million tonnes of crude oil and 250 billion units of electricity, there is a gap between the demand and availability of energy.

With regard to electricity, he said, the gap is about seven per cent in availability and about 17 per cent in meeting the peak demand.

It is estimated that by the end of 2004-2005, the demand of coal would rise to 450-550 million tonnes and of oil to 95-125 million tonnes and of electric-

ity to 645 billion units.

The fiscal and Physical resources needed to implement such an energy development programme are staggering, he said. An astronomical amount of Rs. 4,00,000 crores would be required to develop energy resources to meet this demand.

Mr. Khan said it would be very difficult, perhaps impossible, to raise resources of this magnitude. A two-pronged strategy, he said, is needed to strike a balance between demand and supply.

Resources would have to be mobilised for increasing energy availability and equal attention should be given to energy management and conservation.

Short-term and long-term measures are needed to tackle the energy problem. In the short-term, more emphasis would have to be laid on renovation and modernisation of existing power plants.

Other measures included completion of projects on time, taking up short gestation gas-based projects, installation of capacitors to improve the quality of power supply and focussing on transmission and distribution programmes.

As a long-term measure, more emphasis could be given to development of hydel power, Mr. Khan said adding, India has vast potential of 84,000 mw of hydel power of which only 14 per cent had been exploited so far. For ideal power management, he said, hydel-thermal mix should be 40 to 60 per cent. Now it is 28 to 72 per cent.

The Minister pointed out that advanced countries, though better off in terms of energy supply, had introduced energy conservation and their products have become competitive in the international market because of reduced costs of energy inputs. India, he said, is still struggling in this regard.

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## PHDCCI moots easier FERA, MRTP Acts

The PHD Chamber of commerce and Industry (PHDCCI) has suggested immediate liberalisation of the MRTP and FERA Acts and an increase in the investment limit of MRTP companies, with a view to allow maximum utilisation of their existing capacities. In this context, the Chamber President Mr. Kanwar said the need of the hour is to make the best use of the existing capacities, irrespective of the size of the units. He also suggested that the concept of a dominant undertaking be made realistic and in tune with the present situation. Dominance should be determined in terms of the share of the market and not on the basis of assets, he said.

The Chamber President said that the process of globalisation in the industrial sector has to start immediately lest it might be too late. The mood to share expertise, knowledge and resources are now prevailing strong in the international economy, he felt. The developed

countries as well, were ready to vacate many labour intensive industries. Moreover, a fresh spirit of cooperation has emerged in Europe and the Asia-Pacific, he said.

Mr. Kanwar said that the interests and satisfaction of the consumers has to be kept in view while formulating the various aspects of the new industrial policy. This, he said was necessary as the Indian industrial policy is framed primarily from the point of view of encouraging entrepreneurs and not from the point of view of consumers.

To bring about a qualitative transformation in the industrial economy, the Government has to formulate the policy according to the consumers' interests. Issues like the minimum economies of scale, scope for the large houses and items to be reserved for the small scale sector should be decided only after taking into account consumers' welfare

Mr. Kanwar stated.

## PLASTIC WOVEN SACKS: EC ORDER OPENS UP MARKET FOR INDIANS

The European Community (EC) has slapped a 43.4 per cent provisional anti-dumping duty on plastic woven sacks of Chinese origin. China is the world's foremost supplier of plastic sacks. Indian exporters have been finding it difficult to compete with Chinese material. The EC order dated July 17 makes Chinese bags very expensive and opens up the market to Indian exporters. Next to China, India is the leading player in the world market. The EC order, however, is provisional and is valid for four months.

Given the current raw material scarcity, it remains to be seen whether India can take advantage of the situation unless the punitive levy on Chinese bags continues beyond four months.

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## INDUSTRIAL PRODUCTION IN 1990-91

**10 Pc growth forecast**

The industry ministry has forecast a minimum of 10 per cent growth in industrial production for 1990-91 despite the poor investment climate in the first quarter of this year.

This high growth in industrial production is fixed on the basis of the high growth of 13 per cent in the first two months of the present financial year. Incidentally, this growth was on a low base of 2.5 per cent for April-May, 1990.

Also, the industrial growth in the first two months was largely due to the 15.6 per cent growth in the manufacturing sector, over the low base of last year. Manufacturing sector suffered a marginal fall during the same period last year.

According to an official note, if the major constraint of raw materials for the production of iron and steel and non-ferrous metals are removed, a growth rate of over 10 per cent may not be difficult to achieve in 1990-91. This even includes adequate foreign exchange for the import of these critical raw materials.

The forecast for 1990-91 exceeds the growth rates for the past two years. In 1988-89, industrial production grew at the rate of 8.8 per cent and in 1989-90, at 8.4 per cent. The note admits that the investment climate in the economy is rather poor.

The sanctions by financial institutions has fallen by 20 per cent during April-June, 1990, and the disbursements fell by one per cent from the corresponding period last year.

But it explains that the fall was due to the exceptionally high growth in the past two years. The sanctions accorded an increase of 55 per cent in 1988-89 and 10.7 per cent in 1989-90. The disbursements also increased by 33.3 per cent

in 1988-89 and 8.7 per cent in 1989-90.

The note points out the poor performance of the infrastructural sector. Six infrastructural industries that account for 30 per cent in the index for industrial production have shown an increase of 5.6 per cent during April-July, 1990, compared with the growth of six per cent during the same period last year. These industries are: electricity, coal, saleable steel, petroleum products, crude petroleum and cement.

Interestingly, the note says that the high growth in exports in the last three years has led to increasing infrastructural bottlenecks. There is lack of adequate warehousing capacity at airports and international cargo capacity is also less than needed.

In addition, there are increasing difficulties in internal movement and facilities for containers. The note gives a break-up of the industrial production in the different sectors. The capital goods industries seem to have improved on their high growth of last year. During April-May, 1990, the capital goods sector showed an increase of 37.6 per cent.

The note explains that the capital goods growth was mainly contributed by the excellent performance of computer systems and its peripherals.

During the first two months of this year, consumer durables grew at the 19.6 per cent growth of consumer durables. The consumer durables grew by a mere two per cent last year. The basic industries grew by six per cent and the intermediate industries at the rate of 6.2 per cent.

**DUTY DRAWBACK DISBURSAL NORMS SIMPLIFIED**

The Union government has further

simplified the regulations governing disbursement of duty drawback to exporters.

The government, has dispensed with the old system of crediting refund of duty drawback cheques to the bank account of shippers. Instead, it would now give the refund cheques directly to shippers' representatives.

This decision will come into effect from September 15. Exporters had been demanding an early end to the old system of refund on the ground that it was causing problem of linking those refunds to relevant export consignments.

The Union government has now permitted manufacturer-exporters to surrender the REP licences earned by them before the last date of expiry of the licences. This particular gesture would not in anyway affect the interest of manufacturer-exporters in respect of their tax liability, according to the government's decision.

In yet another decision, the government has exempted the export trading houses having a five-year unblemished track record from the need to submit various certificates of chartered accountants in respect of their claims.

Making these announcements at an exporters meeting with senior customs officials recently, Mr. Ramu Deora, president of Federation of Indian Export Organisation (FIEO), said that the government has also assured that all duty drawback claims, if properly supported with documents and submitted at the beginning of every fortnight, would be settled within that fortnight itself.

The commerce ministry has also decided that the export commissioner and senior officials of the office of Chief Controller of Imports and Exports (CCI&E) in Delhi would come down to Bombay for three days every month and try to resolve specific policy issues of exporters.

## NATIONAL R &amp; D

## Investment remains at last year's level

As a fraction of the Gross National Product (GNP), the national research and development (R and D) expenditure for the year 1987-88, was nearly the same that of 1988-89, according to the latest R and D statistics published by the department of science and technology (DST). In real terms, the amount for national R and D has increased from Rs. 2,495.87 in 1986-87 to Rs. 2,936.94 in 1987-88 and to Rs. 3,471.81 crores in 1988-89. The GNP fraction for these years has been 0.96 per cent, 1.01 per cent and one per cent respectively. The estimated R and D expenditure for 1989-90 is Rs. 4,003.79 crore and the GNP is estimated to have shown a six per cent increase over 1988-89. The 1988-89 GNP value is Rs. 3,46,277 crores.

The DST document has drawn attention to the point that R and d expenditure has been increasing faster than the GNP. The annual compound rate of growth of the GNP for the period 1986-87 to 1988-89 was 15.7 per cent, whereas the growth of R and D spending for the same period was 17.9 per cent. Out of the total R and D expenditure for 1988-89, the share of the Central Government, including the public sector industry, was 82.8 per cent (Rs. 2,875.11 crore), that of the private sector was 10.5 per cent and the rest 6.7 per cent was incurred by the state governments.

Three-fourth of the Central investment on R and D came from major scientific agencies like the atomic energy, space, the CSIR, the ICAR etc. The Defence Research and Development Organisation (DRDO) accounted for 27 per cent of the expenditure by the Central R and D agencies. The state sector spent Rs. 232.91 crore for R and D in 1988-89, about 98 per cent of which was on agriculture and allied areas. About 18.4 per cent of the total share of state spending on R and D was by

Maharashtra. Viewed differently, the governmental investment — both Central and state — accounted for 79.1 per cent of this expenditure, while the industrial sector — both public and private — spent the rest 20.9 per cent. This share between the institutional and industrial sector has also remained roughly the same over the last two years. The document notes that, this is contrary to what one observes for the developed countries where the industrial sector accounts for more than 50 per cent of the national R and D expenditure.

Industrial investment on R and D in 1988-89 attained a level of Rs. 725.11 crore. This should be compared with Rs. 527.33 crore in 1986-87 and Rs. 598.74 crore in 1987-88. Of the total industrial sector investment 49.8 per cent was by 121 public/joint sector undertaking and the rest 50.2 per cent by 895 private sector in-house R and D units.

About Rs. 129.70 crore of the total investment by the industrial sector was in the group of defence industries. The next highest investment of Rs. 118.03 crore being in the area of electronics and electricals. As percentage of sales turnover the Indian industry, however, the R and D expenditure works out to only 0.72 per cent.

The industrial R and D figures should be compared with the corresponding ones for 1986-87 and 1987-88. The share of public sector in 1986-87 and 1987-88 were 44.7 per cent and 48.2 per cent respectively. The share of the private sector for these two years were 55.3 per cent and 51.8 per cent respectively.

This points to the fact that the share of public sector R and D investment, has been growing. This point emerges even if one analyses the investment figures of a fixed number of in-house R and D units over the period of three years.

Though the country's R and D investment is on the increase, having reached a figure of one per cent of the GNP, Internationally our spending on R and D is still on the lower side. Most of the developed countries spend over two per cent of their GNP on R and D while developing countries spend around 0.5 per cent. The per capita R and D expenditure in India is about \$ 3 developed countries.

The document makes an interesting observation in relation to the question of productivity of R and D vis-a-vis level of investment in the country. In the absence of clearcut indicators to answer this, the number of applications of patents has been taken as a qualitative parameter indicative of this.

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### IMPORTS UNDER OGL BY SMALL UNITS

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The government has allowed new and proposed units in the small-scale sector to import raw materials, components and consumables under Open Genreal Licence (OGL) subject to certain conditions. These units at the time of customs clearance, will have to produce evidence to the effect that the actual users have furnished a bond with a bank guarantee for a value to 25 per cent of the C.I.F. value of the imported goods.

According to a public notice issued by the chief controller of imports and exports, sub-para (7) of paragraph 62 relating to new and proposed units in the import-export policy (Vol. I) has also been amended to read: "New/proposed units in the small scale sector would be required to furnish at the time of customs clearance a bond and bank guarantee to the extent of 25 per cent of the value of actual imports against a supplementary licence or under OGL. "These units will not be required to furnish bond and bank guarantee if they have gone into production and submit a certificate to this effect from the director of industries concerned."

## Company Notes

### GLAXO REPORTS HIGHER PROFITABILITY

Glaxo India Ltd., have announced their results for the year ended March 1990. The following are brief highlights of their results.

#### Financial Performance

Net sales of the company moved up to Rs. 292.04 crores from Rs. 194.99 crores (19 months period). Operating profit (net profit before interest & depreciation) went upto Rs. 34.39 crores from Rs. 22.09 crores. Profitability of the company has shown an upswing. Net Profit before tax has moved up to Rs. 15.22 crores from Rs. 10.02 crores. The company proposed a final dividend of 15% in addition to the interim dividend of 20% declared. Sales of pharmaceutical products have grown at a satisfactory rate. New products introduced during the year included antibiotics and cortiosteroids.

Sales of food products have also shown good growth. The range of products in flexible packs is being gradually increased. The company's joint sector project in UP has started commercial production of edible oils. Sales of veterinary products adversely affected during the previous year has improved significantly.

The company has been legally advised that it is not required to make any payment into the Drugs price Equitisation Account in respect of betamethasone prices.

The company has carried forward an amount of Rs. 4.09 crores (net of referred tax credit) against an amount of Rs. 11.12 crores during the previous period.

#### Exports:

Earnings from exports also went up to Rs. 7.54 crores including Rs. 4.05

crores to rupee trade arrangement from Rs. 5.08 crores (including Rs. 2.41 crores to rupee trade countries) during the previous period.

#### Imports:

Foreign exchange outflow in respect of imports for raw materials and goods for resale have also gone up substantially.

#### Research & Development

Clinical studies are on in an advanced oral antibiotic as well as a non sedating antihistamine. Development work to improve the efficiency of the manufacturing process for cephalexin was undertaken. Work on modification of the manufacturing process for betamethasone was carried out.

Association with RRL, Hyderabad for the improvement in technology for manufacture for Vitamin A has been strengthened. Amount spent on R & D has been as under.

Capital Expenditure — Rs. 45 lakhs  
Recurring — Rs. 2.63 crores.

The amount represents approximately 1.1% of total turnover.

### KHAMBATA TO HEAD GLAXO

Mr. J.S. Khambata will take over as chairman of Glaxo India Ltd. He will succeed Mr. N.M. Wagle, who is to retire after the annual general meeting.

Mr. Khambata, at present, vice-chairman and managing director, has been on Glaxo India's board since October, 1973, and the managing director since January, 1978. Mr. Khambata's team as managing director expires in December 1990. The board has decided to appoint him a 'non retiring whole time director' for five years from January 1, 1991. The board has also decided to vest Mr. H. Dhanrajgir with full executive responsibility for the management of the company for a

five-year period with effect from January 1, 1991.

Mr. Dhanrajgir has been the managing director since January 1, 1990. In view of the executive responsibility being vested in him, he will be relieved of his present post of managing director from December 31, 1990.

Four senior vice-presidents of the company are also being inducted into the board. They are Mr. R.P. Bharucha, senior vice-president, family products division, Mr. M.L. Dhar, senior vice-president, primary manufacturing and technical division, Mr. H.P. Khusrokhhan, senior vice-president, pharma division, and Mr. A.T. Vaswani, senior vice-president, finance and secretarial division.

While all of them are being inducted as whole-time directors, Mr. Bharucha, Mr. Khusrokhhan and Mr. Vaswani are being inducted as alternate directors. Mr. Bharucha will be alternate director for Mr. M.S. Stone, Mr. Khusrokhhan for Mr. N. Maidment and Mr. Vaswani for Mr. J.D. Commbe. At least four foreign directors quit the board during the current year. They are Mr. H. McCorquodale, Mr. H.M. Samlley, Mr. G.J. Balke and Mr. W.I. Glynn Williams. They were replaced by Mr. Stone, general counsel and director of Glaxo Far East (Pvt) Ltd., Mr. Maidment, a director on several Glaxo enterprises in China and Hong Kong, Mr. A.M. Pappas, executive director of Glaxo Holdings Plc., UK, and Mr. T. Thomas, former chairman of Hindustan Lever.

### UB PETRO'S RECORD BUSINESS

UB Petroproducts Ltd. has registered a record sale of 200 tonnes of products in just 14 days from August 17 to 31.

The plant, a Rs. 81-crore joint venture of the UB group with Tamil Nadu Industrial Development Corporation was formerly inaugurated on August 12.

The company has secured its first export order for 10 tonnes of polyol from Nepal and is negotiating with other countries. It intends to ensure ready availability of international quality substitution chemicals in quantities sufficient to meet the all India demand. The company estimates that this will enable the Government to save nearly Rs. 50 crores in foreign exchange.

Amongst the immediate plans for the future is a proposal to undertake production of 14 different grades of polyols required for the manufacture of packaging application, wood substitute articles, polyurethane elastomer manufacture of automobile components etc.

The company has also been negotiating with the Government for bringing TDI (toluene di-isocyanate) under 'stock and sale' category of imports for easy availability to foamers, who are in the small scale industry sector. In addition, providing sufficient quantities of propylene oxide would give a boost to several other petrochemical manufacturers.

### **VANAVIL DYES AND CHEMICALS: POISED FOR GROWTH**

Vanavil Dyes and Chemicals Limited, which became a subsidiary of Colour-Chem Ltd., on May 7, 1990 is poised for a phase of consolidation and growth — having come back in the last couple of years from the verge of turning into a sick unit. More importantly, Vanavil is fast emerging as a big exporter of dye intermediates and is expected to become a sourcing point for the requirements of Colour-Chem's collaborators and associates abroad such as Hoechst AG of Germany.

All this is of course, subject to the induction of additional resources by Colour Chem, expansion of present capacities and more importantly the injection of at least a couple of crores of rupees by the parent company for upgrading pollution control facilities

and disposal of effluents. Colour-Chem became a joint promoter of Vanavil along with the Tamil Nadu Industrial Development Corporation (TIDCO) when the original private sector promoter backed out of the project. The attraction was that Vanavil had a licence to manufacture Naphthols, a critical raw material for Colour-Chem's pigment production which was in short supply and had just then been reserved for the small sector.

The company went public in 1984, with a 26 per cent stake by TIDCO, 25 per cent by Colour-Chem and an offer of 8.81 lakhs shares to the public. Colour-Chem intended to treat Vanavil as an ancillary unit supplying fast colour bases, Naphthols and to manufacture some ad hoc products as per the company's requirement.

In the latest year ended March 31, 1990 — Vanavil's sales turnover rose 70 per cent on an annualised basis to Rs. 1,733.54 lakhs and pre-tax profit amounted to Rs. 82.60 lakhs — 234 per cent increase on an annualised basis over the previous year.

Carryforward losses were wiped out to the extent of Rs. 61.75 lakhs and the balance loss of Rs. 19.68 lakhs could also have been cleared but for the provision of Rs. 36.88 lakhs for investment allowance reserve. An increase in trading income also contributed to the jump revenue — since the parent company, Colour-Chem decided to use the marketing base set up by Vanavil to market its own products in the South. As a result trading income increased from Rs. 24 lakhs in 1989 to Rs. 63.96 lakhs in the latest year.

According to the chairman Mr. K.R.V. Subrahmanian, the current year should show another 25 per cent increase in turnover with consequent improvement in profitability. There is unlikely to be a tax liability during the year, which means that Vanavil would be in a position to announce its maiden

dividend. However the most important change has been on the export front. The chairman states in his speech that the company will now have access to new export outlets apart from latest technical know-how available with Hoechst AG.

Exports to Hoechst AG as well as other countries have already picked up — in the latest year the company has announced a direct export earning of Rs. 61.82 lakhs it had also sold a dye intermediate through an export house worth Rs. 146.86 lakhs. Vanavil exported Chloroanilines to Hoechst AG and some dye intermediates during the year.

Mr. Subrahmanian, however, cautions that there will be no dramatic increase in exports unless the environmental standards in Cuddalore are upgraded to pass the audit of Hoechst AG — only then will additional capacities be added which will enhance exports.

While Vanavil plans to invest around Rs. 2 crore in environmental measures over the next couple of years — it would require a lot of help from the state government or rather the SIPCOT Industrial Complex at Cuddalore. One of the major problems in the area is lack of proper marine outfall into the sea for disposal of treated effluents. In fact, the company at present allows its treated effluents to flow on to its own land and depends on solar heat to dispose them.

Since Colour-Chem's collaborator is unlikely to part with any technology for additional capacity at Vanavil unless environmental problems are sorted out — all further growth particularly for exports would depend on action by SIPCOT. That is not to say that growth will come to a standstill — in fact the stock markets have already reacted to the changes at Vanavil — particularly the mutual funds and the share shot up from around Rs. 30 to touch Rs. 50 in last few weeks.

## DIAMINES & CHEMICALS

Diamines and Chemicals has hiked the dividend to the record level of 22 per cent for the year ended March 1990 from 15 per cent paid last year.

It has produced better results. The gross profit is up to Rs. 196.49 lakhs from Rs. 155.15 lakhs following a rise in gross sales to Rs. 16.89 crores from Rs. 10.96 crores in the previous year. The net profit has shot up to Rs. 76.31 lakhs from Rs. 34.30 lakhs after depreciation (Rs. 106.18 lakhs against Rs. 64.69 lakhs) and taxation Rs. 14 lakhs against Rs. 4.82 lakhs. The disposable profit is Rs. 82.98 lakhs compared to Rs. 38.69 lakhs.

The dividend pay-out is Rs. 40.66 lakhs against Rs. 27.72 lakhs. It has allocated Rs. eight lakhs against Rs. 4.30 lakhs to the general reserve. The balance Rs. 34.42 lakhs against Rs. 6.67 lakhs is being carried forward.

It has exported 255 tonnes of ethylenamines worth Rs. 118.62 lakhs. Last year export was 120 tonnes. The company has completed implementation of phase-II of modernisation-cum-expansion by which it has now been possible to reach production level of 2,100 tonnes a year against the licensed capacity of 2,000 tonnes. It has also completed its piperazine plant with entire indigenous technology and considering the installed capacity of 150 tonnes a year of piperazine plant, the total installed capacity achieved comes to 2,250 tonnes yearly.

It has already obtained a letter of intent for enhancement of production capacity of ethylenamines to 5,000 tonnes from 2,000 tonnes and industrial licence for the manufacture of 300 tonnes of piperazine.

The management intends to achieve these capacities at the existing plant site in a phased manner to meet the

increased market needs.

## PFIZER

The performance of Pfizer during the first four months of the current year is encouraging. It has recorded a growth of around 30 per cent in sales over the corresponding period last year, according to Mr. S.V. Pillai, Chairman of the company.

Addressing shareholders at the company's annual general meeting at Bombay, he cautioned that it was difficult to predict the situation in the coming months, in the context of frequent official statements on DPCO and other industry matters, and concerned about the inflationary trends affecting the industry.

He said that Piroxicam, a major anti-arthritic drug, discovered and developed by Pfizer was launched in India under the brand name 'Dolonex'. The company continued to enjoy leading market shares for many of its products. Same in the case of its range of animal health products also.

The company was in the process of introducing a product called 'Distodin', an effective therapy for the treatment of liver fluke worms in cattle, and also examining the possibility of introducing some of the hospital products in the Pfizer range, available in USA and other countries.

On the manufacturing front, productivity levels at all the plants were encouraging and had been able to overcome many of the earlier constraints. The luphoric drugs plant at Ankleshwar was being modernised and expanded, and when complete, this would become an important addition to its manufacturing facilities, he added.

## IPCL DECLARES Rs. 18.6 CRORES DIVIDEND

Indian Petrochemicals Corporation

Ltd., (IPCL) a government of India undertaking, has declared a dividend of Rs. 18.6 crores on its paid up share capital of Rs. 186 crores, for the year ending 31st March 1990. This is the sixth year in a row that IPCL has declared a dividend of Rs. 18.6 crores each year. This decision was taken in IPCL's twenty first annual general meeting held in Baroda on August 27, 1990. IPCL had a rewarding year, 31st March 1990, posting a sales turnover of Rs. 1,179 crores, representing a 14% increase over that of the previous year, earning a gross profit of Rs. 217 crores and net profit of Rs. 96 crores. IPCL also reduced its specific energy consumption by 7% over that in the previous year. During 1989-90 IPCL's Rs. 1390 crore Maharashtra Gas Cracker Complex at Nagothane was mechanically completed. IPCL received a letter of intent from the Government of India for setting up a Rs. 2,665 crore integrated gas based petrochemical complex at Gandhar in Gujarat. A significant initiative by IPCL was in terms of crystallisation of a joint venture with M/s General Electric Plastics, B.V., the Netherlands to manufacture advanced engineering plastics in India.

During 1989-90, IPCL issued a largest commercial paper, worth Rs. 30 crores, which was accorded the highest rating of P1+ by The Credit Rating and Information Services India Ltd. IPCL also successfully commercialised an indigenous monometallic reforming catalyst for aromatics productions and a new generation encillite catalyst for xylenes isomerisation. A bi-metallic catalyst for naphtha reforming has been produced and is being commercialised.

IPCL received two prestigious awards 1989-90 — The 1989 FICCI award for environmental preservation and pollution control and the International Award of Honour from The National Safety Council, USA for its safety performance. This safety award was conferred on IPCL for the ninth time and for the sixth consecutive year.

## Shalimar Paints unit at Nashik

Shalimar Paints Ltd., will be setting up a second paint unit at Nashik in Maharashtra. Production at the unit is expected to begin next year. Though the actual product mix is yet to be decided, the unit will concentrate on decorative paints to strengthen the company's presence in that sector of the market.

The estimated investment in the project will be in the region of Rs. five to six crores, Mr. R. Jindal, director Shalimar Paints, told newsmen after the conclusion of the company's annual general meeting held at Calcutta recently. Financing proposals for setting up the project would be submitted to the financial institutions shortly.

The company declared a dividend of ten per cent for the financial year ended March 31, 1990. Sales at Rs. 71.62 crores was approximately 19 per cent higher over the 1988-89 figures on annualised basis. Actual sales in the 15-month accounting period ended March 31, 1989, stood at Rs. 75.15 crores. Profit before tax for 1989-90 stood at Rs. 81.84 lakhs (Rs. 2.09 crores) while profit after tax stood at Rs. 72.74 lakhs (Rs. 2.09 crores).

Land has already been purchased for the Nashik unit. As of now, the plant will be using technology supplied by Salkie of Italy, though other sources of technology may be tapped in future. The unit may be set up in two phases and will make resins, emulsions and other paint additives besides paints. At a future date, production of powder coating paints may be taken up, Mr. M.M. Sabharwal, the company's chairman added.

Nashik has been selected as the site as it is close to sources of raw material and also the Western Indian market which the company wishes to tap in the years to come. At present, the company's products are being transported from Eastern India to markets in the Western part of the country. Meanwhile, the

sale of company's equity held by Courtaulds Coatings Ltd., UK, (formerly International Paints PLC) to the NRI Jhunjhunwala group of Hongkong was yet to receive Reserve Bank and government clearance but this was merely a procedural delay, Mr. Sabharwal said. Certain queries had been raised about the purchase but the replies had been forwarded some time back. There were no more pending queries nor have any fresh queries been raised.

Commenting on the acquisition of the Shalimar stake, Mr. S.Jhunjhunwala, who was present at the meeting, said this was the first major purchase by his group in the country. The fate of the Shalimar venture would be decided by future investments by his group in the country, he said. Mr. Jhunjhunwala has been a NRI for over four decades.

For the present, industrial coatings will continue to be the major area of operation for the company. An arrangement with Courtaulds for the latest technology in this field was under way. Courtaulds Coatings was at present concentrating on marine and powder coating paints and was expected to continue as a technology source in the future in these fields.

On the technology front, the company was engaged at present in developing coil coatings, powder coatings and high solid, including water thinnable, coatings.

### BERGER SHAREHOLDERS TO GET ALLOTMENT IN UB ELASTOMAS

Shareholders of Berger Paints India Ltd will get preferential allotment of shares of UB Elastomas being set up by the UB group of Vizag at an estimated cost of Rs. 400 crores.

Giving this information at the annual general meeting of Berger Paints at Calcutta Mr. Vijay Mallya, the chair-

man of the company said the paint company would be one of the several companies of the UB group which, together with the foreign co-promoter, Presindustria of Italy, would be holding 40 per cent stake in the Vizag-based company having an equity capital of Rs. 110 crores. Berger Paints would contribute to the extent of Rs. one crore in the equity of UB Elastomas, Mr. Mallya said.

Later, he told newsmen that UB Elastomas was likely to go into production in 1992. "Land has been acquired, technical fees provided, design package received, financial sources tied up and orders have been placed for the import of equipment", he said.

In Berger Paints, the priority would be to produce more of value-added items like powder coatings, cathodic electrode coats and heavy duty coatings, he said. "There is so much of competition in the decorative paint business and the market for marine paint limited", he added.

Berger Paints chairman said the results of the company's R and D effort would soon start flowing out to foreign countries as J N Holdings, Plc, UK, had decided to make use of R and D of the Indian subsidiary.

Mr. Mallya who praised the R and D division of the Indian company observed, "we have got excellent people in the company's R and D division and we propose to enhance its strength further by concentrating more on application and formulation results". The development of technology for titanium dioxide was to receive top priority.

"In India, there is a monopoly producer of titanium dioxide in Kerala but its production capacity is limited and technology outdated". He said. "At the international level, the technology is closely guarded by a handful of firms in USA, Japan and Europe and they will not part with their technology".

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## Ministry okays new IISCO revamp plan

The Union steel ministry has approved the revised revamp programme of IISCO. Official sources say that the department of steel would shortly send all the relevant papers concerning the IISCO project to the Public Investment Board (PIB) for clearance.

The sources are confident that both the PIB and the cabinet committee on economic affairs approval for the project would be obtained within the next three months. The ministry has accepted the revised IISCO modernisation programme, as submitted by the Steel Authority of India Limited (SAIL), without any major modifications or alterations.

Mr. Dinesh Goswami, Union steel and mines minister, had reportedly cleared the scheme recently before he left for Assam with some other ministers to attend the North-Eastern Council meeting. Thus, the first major hurdle to IISCO's modernisation has been crossed. The proposal has been hanging fire for the last 15 years, during which several Indian and foreign consultants had been engaged to prepare a feasibility report for modernisation of the 70-year-old steel plant. The earlier feasibility and project reports had all been rejected.

The IISCO modernisation will be

based on a project report, prepared by a group of Japanese steel consultants, headed by Nippon Steel, and modified by M.N. Dastur and Company and SAIL's projects division.

However, the original Japanese proposal concerning the plant, capacity expansion, product-mix, financing norms and the implementation method have been totally rejected.

The Japanese had recommended a break-and-rebuild programme for IISCO, raising its capacity to 2.15 million tonnes, on a turn-key basis, with an investment of about Rs. 6,800 crore. The revised Indian Iron modernisation proposal, as approved by the steel ministry, envisages a production capacity of 1.8 million tonnes, requiring an investment of around Rs. 5,000 crore, foreign exchange involvement being about 20 per cent of the project cost. However, the final say on project cost rests with the PIB.

The sources say that the change in IISCO's product-mix under the revised programme 'will bring a very attractive return on investment in the neighbourhood of 10 per cent.

The project will not be implemented on a turn-key basis and the foreign technology will be obtained through global

tenders. SAIL will strive to ensure that the project does not suffer from time or cost overrun.

## IRON, STEEL EXPORTS UNDER OGL

To bail itself out from the foreign exchange crisis, the Government has allowed export of iron and steel under open general licence (OGL). A public notice No. 43-ETC (PN)/90 dated August 24, was issued at New Delhi on August 31. However, cast iron prices and fittings namely, steel produced by integrated steel plants, alloy steel plants, mini steel plants, secondary producers and re-rollers would not be allowed to be exported, the notice added.

The exporters would have to submit a 'no objection certificate' (NOC) from the Development Commissioner for Iron and Steel, Calcutta, before exporting. A maximum limit of 10% of the total production has also been prescribed. The necessary export trade control (ETC) has also been issued. In a separate public notice No. 42-ETN(PN)/90 dated August 24, the Government has also allowed export of decorative grass and non-edible grass other than fodder grass on production of NOC from the Chief Conservator of Forest, Deputy-Director Wild Life Preservation, or any other designated officer of the Ministry of Forest, Environment and Wild Life.

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## FAL-G an alternative to Portland cement

An obsession with putting solid waste to good use has resulted in the formulation of a low-cost technology that could revolutionise the building industry by cutting costs by half. The wonder product is FAL-G which uses flyash, the waste material generated in lakhs every year by thermal power stations, to replace the costly Portland cement in the production of precast construction items like concrete blocks.

It is the outcome of two years of research by an entrepreneur couple from Visakhapatnam who have succeeded in getting FAL-G concrete blocks and roofing blocks used in low-cost housing in the region.

Mrs. N. Bhanumathidas, who along with her husband, Mr. N. Kalidas has formulated the Bhanu flyash technology, hopes that in two years it would spread across the country to usher in a housing revolution. She told the *Economic Times* that HUDCO which had sponsored a seminar in July on the use of flyash technology, was ready to promote their process.

Mrs. Bhanumathidas claims studies have proved that FAL-G concrete can be developed with strengths equivalent to that of Portland cement concrete at about 50 per cent of the costs. Further research is underway to determine the corrosiveness of this product on reinforced steel before promoting its use in RCC.

Three factors make FAL-G an extremely attractive alternative to Portland cement. Flyash is available in plenty with the annual generation by thermal stations estimated at 300 lakh tonnes. By the turn of the century, it is expected to treble to 900 lakh tonnes. All this is exclusive of accumulations which are said to be massive.

Secondly, the process used is extremely simple. No sintering or autoclaving is required as simple water spray

curing is sufficient. Early gain of strength in the material which uses 70 per cent flyash and 15 per cent each of calcined gypsum and lime allows despatch of the blocks from the fourth of the seventh day of casting.

The biggest selling point of the technology is that an outlay of just Rs. 2 lakhs is needed on plant and machinery for an output of 3,000 cubic metres. As Mrs. Bhanumathidas explains, over the years any number of processes have been explored for utilising flyash effectively but no approach could provide a satisfactory solution to use the waste material in large quantities.

Although some technologies have promoted the use of flyash in conjunction with cement and clay, the processes have proved to be too costly, calling for an investment between 20 lakhs and Rs. 50 lakhs for producing 3,000 cubic metres.

This is the first time a low-cost technology for using flyash has been formulated in the country, claims Mrs. Bhanumathidas who has dedicated it to the nation, to ensure rapid and widespread propagation. Immediate applications of the technology are in the cottage industry which can use it to make plant pots, ventilator blocks, staircase stumps and ornamentation for boundary walls.

It is however, the next step that holds greater promise for revolutionising the construction sector. This is to produce FAL-G cement which could be bagged and sold anywhere in the country. A different process would be required for making the cement and Mrs. Bhanumathidas is planning to set up a pilot plant with technical assistance from Salzgitteer Industriebau of West Germany to demonstrate its feasibility.

Factories of one lakh to ten-lakh tonne capacities are the only solution to dispose the huge flyash accumulation in the country, points the entrepreneur

whose consultancy firm Bhanu International has a tie-up with the German company. The main consideration in setting up plants to make FAL-G cement would not be just the environmental question. As with other commercial ventures, it would primarily be based on costs — FAL-G cement would cost only Rs. 500 per tonne against Rs. 300 to Rs. 400 more for Portland.

Ours is a technology which has implications for the ministries of energy, environment and housing and urban development, points out the researcher who is working on several other waste utilisation projects. What is required is a clearcut policy on flyash that would promote its proper use.

This should cover free supply of flyash from thermal power plants to such projects, allocation of land in their vicinity and adequate funding from the financial institutions on a priority basis and subsidy from either HUDCO or the urban development ministry for plant and machinery used in flyash projects.

If a serious attempt is made to provide some incentives, says Mrs. Bhanumathidas, we could be witnessing a stupendous change: a clean-up of the environment, a pollution-free low-cost industry that would help conserve energy and provide cheaper housing for the country's homeless millions.

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### GNL TO MERGE WITH GSFC

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Gujarat Nylons Ltd. (GNL) proposes to merge with Gujarat State Fertilisers Company (GSFC) effective from April 1, 1990, subject to necessary clearance. As per the merger scheme GSFC will offer one equity share of Rs. 10 each for every eight equity shares of Rs. 10 each of GNL.

The shareholders of GNL will be eligible for the dividend to be declared by GSFC for the current year ending March, 1991 and also they are entitled to the bonus issue of three-for-ten.

## Steel policy may be relaxed further

The Department of Steel is thinking of liberalising the steel policy further. A plan has been submitted to initially allow greenfield projects to be set up by the private sector. The next phase will be to completely delicense this sector. The Ministry seems to be in favour of complete freedom to those wishing to enter steel making. The proposal is expected to be put before the Cabinet for approval soon.

The new thinking comes weeks after the Government has already liberalised its 1988 policy. In June this year, the minimum economies of scale were fixed at 2.5 lakh tonnes per annum. Within a month, this was increased to one million tpa. All of a sudden, the Ministry wants to open all doors to the private sector.

The compulsions for such a change seem to be the lack of real interest by the private sector. No new proposals have been received by the Ministry after the new policy was announced. Only the earlier ones are pending. For example, the new policy allows steel units to be set up using the blast furnace (BF) route. Only the Jindals and Mittals have evinced interest in such complexes. The Mukands have talked about it but have not approached the Government. Even these proposals will have to be cleared at the political level.

This is because the policy does not allow any greenfield projects to be set up in the country. In the case of Jindals and Mittals, the respective State Governments are backing the proposals for clearance but it will take time. For other routes (like sponge iron or mini-blast furnace) there has been a lot of hype. No concrete plans have been submitted to the Government. Some of them, like the one submitted by the Ambanis in 1988, have lapsed but the entrepreneurs have made no attempt to rejuvenate it.

Another compulsion has been the lobbying by various parties. TISCO, for a long time, has been serious about putting up a complex at a new site. With competition now knocking at its doors, it has become imperative for it to expand and set up new units. But it cannot do so under the new policy.

Both Viren Shah and the Mittals alongwith the Jindals have been trying hard to convince the Government to make it free for all. The Government, in addition, is sitting tight on proposals given by 32 parties in response to the Government's wish about a year ago.

No decision has been taken on these which include setting up of steel capacities between 1.5 lakh tpa and 2.5 lakh tpa. Many of these include favoured States' industrial corporations like West

Bengal, Orissa, Delhi. Most of these are also greenfield projects. The Department thinks that if other projects are cleared under the new policy, it will be unfair to those who have been waiting for long to get their projects cleared.

### SICOM RAISES LOAN LIMIT TO Rs. 150 LAKHS

On account of the recent revision made by the Industrial Development Bank of India (IDBI) in its Refinance Scheme, the State Industrial and Investment Corporation of Maharashtra (SICOM) is now in a position to advance term loans up to Rs. 150 lakhs to a single industrial project with an investment up to Rs. 5 crores. Earlier, the limits under this scheme were Rs. 90 lakhs for term loans and Rs. 3 crores for project cost.

### 'A' STATUS FOR HINDUSTAN ZINC

The public sector enterprise in the Union Department of Mines, Hindustan Zinc Ltd. (HZL), has been accorded schedule 'A' status by the Government of India. The Government has also appointed Mr. A.C. Wadhawan, an eminent metallurgist and a recipient of the Bralco Gold Medal from the Indian Institute of Metals, as Chairman-Managing Director.

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## SM Dyechem to set up carbon black project

SM Dyechem Ltd. is setting up a Rs. 90 crore carbon black project in the joint sector with the participation of the Karnataka State Industrial Development Corporation (KSIDC) and the South Korean Corporation, Lucky Goldstar. The project, to be set up at Mangalore in Karnataka, envisages a 20 per cent equity participation from the South Korean company. KSIDC and the promoter, SM Dyechem, pick up 10 per cent and 40 per cent, respectively, while the rest is to be offered to the public.

Apart from equity participation, Lucky Goldstar will transfer state-of-the-art technology for the project with an installed capacity of 50,000 t.p.a. of carbon black. KSIDC is participating in the venture because the original letter of intent for the project was issued in its name. The project, for which other details are still being worked out, is expected to take off commercially in the second half of 1993. With the South Korean company committing to buy back over 40 per cent of the total production of the new company, the promoters do not foresee any marketing constraints.

Even otherwise, the new company should have no marketing problems with the National Front government having delicensed automotive tyre production to draw new entrepreneurs. Though the government move has yet to attract investment from new entrepreneurs, it has at least helped the existing tyre manufacturers to increase capacity by a million tyres. This, in turn, has raised the demand for carbon black.

Meanwhile, SM Dyechem has got all the clearances, except that from the controller of capital issues, for its Rs. 275 crore monoethylene glycol project at Pune. The CCI okay is expected shortly, according to its chairman, Mr. S.M. Shetty. It has also received SIA registration for the production of methanol at Machilipatnam in Andhra Pradesh with an installed capacity of 300,000 tonnes.

For this, the company has also obtained ONGC's consent for supply of the required quantity of gas. That apart, according to Mr. Shetty, it has secured SIA registration for the production of 5,60,000 tonnes of pig iron near Pune.

According to the working results of the company for the year ended March 31, turnover has grown by 143 per cent on an annualised basis, from Rs. 25.79 crores in the 18-month period of 1987-89 to Rs. 41.97 crores in 1989-90. Its gross profit, during this accounting period, had gone up by 192 per cent, from Rs. 2.3 crores to Rs. 4.48 crores. Consequently, the board increased dividend from 24 to 30 per cent.

The company has begun to export some of its fast food items, and is, at the same time, exploring markets abroad for its speciality chemicals for leather, pesticides and man-made fibre industries.

### INPUT SHORTAGE MAY LEAD TO ALUMINIUM IMPORTS

India which has been exporting aluminium for the past two years, may be forced to import this metal if the current shortage of raw petroleum coke caused by the reduced import of this item by Indian Oil Corporation continues.

Raw petroleum coke is used for making calcined petroleum coke to manufacture alumina from which aluminium is produced.

The reduction in the import of raw petroleum coke follows the government's decision to cut down the exchange allocation for importing this item by IOC due to the country's difficult balance of payment position. The shortage of raw petroleum coke will be more pronounced after the present stocks with aluminium products are exhausted in the next few days.

The Union Mines Department has taken up with the Finance Ministry the question of restoring the cut in the exchange allocation to IOC which is only about Rs. 20 crores so that there is an uninterrupted supply of raw petroleum coke to the aluminium industry and imports are not resorted to leading to a huge exchange outflow.

There were no aluminium imports by Minerals and Metals Trading Corporation during 1988-89 and 1989-90 due to increased availability of the metal from the National Aluminium Company Ltd (NALCO). However, imports were allowed under open general licence but this facility was withdrawn subsequently.

The shortage of raw petroleum coke comes at a time when a marginal fall in aluminium production is anticipated by NALCO due to an accident in May which forced a shut down of one of the units of its captive power station and the problem of recommissioning all the pot-lines in the smelter. Added to that was the recent cyclone in Andhra Pradesh which affected the movement of raw material. NALCO's total production during 1990-91 is now projected at about 1.50 lakh tonnes against the target of 1.80 lakh tonnes.

The company earned Rs. 409 crores in foreign exchange by exporting 4.49 lakh tonnes of alumina and 27,000 tonnes of aluminium in 1989-90. Meanwhile, the aluminium industry's proposal for expansion of its smelting capacity during the eighth plan is under consideration of the government. NALCO has proposed an expansion by 1.15 lakh tonnes, while Hindal and Balco have together planned an expansion by 3.15 lakh tonnes.

Of these Balco's expansion is virtually dependent on tying up new sources of supply of bauxite because of the uncertainty about developing the Gandharmardan project in Orissa due to local agitation.

## TISCO to export output of Indian Charge Chrome

TISCO has entered into an agreement with the Orissa-based Indian Charge Chrome Ltd. (ICCL) for exporting its entire production. ICCL, promoted by Indian Metals and Ferro Alloys (IMFA) in 1982, was set up as a 100 per cent export-oriented unit to manufacture high carbon ferro chrome at Chowduar, an industrial growth centre located between Bhubaneswar and Cuttack.

Under the arrangement, TISCO will supply raw material to the company from its iron ore mines at Sukinda in Orissa. TISCO has taken on lease from the state government almost 90-95 per cent of the mines there and is in a position to supply raw material to ICCL at a low cost to make the finished product competitive in the global market.

The agreement also says that TISCO will undertake to export ICCL's entire production. The announcement suits both the companies admirably as ICCL will be able to manufacture at a low cost and face no marketing difficulty, and TISCO will be able to increase its exports. TISCO, it may be recalled, has decided to increase exports to about Rs. 500 crores by 1994-95.

TISCO has been considering the possibility of exporting ferrochrome for sometime. The product was in great demand in international market even a year ago, fetching attractive prices. But, of late, it has been witnessing sharp fluctuations in prices. The price per kg has seen variations between 45 cents and 90 cents, putting Indian exporters in severe difficulties.

TISCO has appealed to the Union Govt. to consider extending some kind of assistance like cash compensatory support to enable exporters to sell overseas at times when the price plunges. It has suggested that such supports could be given only when they are needed and withdrawn as world prices firm up.

The export outlook is not so bright at the moment with international prices ruling at low levels. However, following this new arrangement with ICCL, it should be possible for TISCO to undertake exports, which ICCL, on its own, would not be able to do. ICCL, which has the capacity to manufacture 50,000 tonnes of ferrochrome a year, has commenced commercial production at 30 per cent capacity utilisation.

ICCL has financial and technical collaboration agreement with Elkem A/S of Norway for the manufacture of ferrochrome with major equipment supplies coming from a consortium of Swedish firms, namely, ABB Steel AB, Gota-verken Energy AB and AB-Electro Invest. It is also responsible for erection of plant and training of company personnel.

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### POLICY SUPPORT SOUGHT FOR SOUTHERN MINERAL EXPORTERS

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South India will be able to export large quantities of processed minerals and granite, if certain policy changes are initiated to encourage private efforts. This was emphasised at the southern regional conference of the Chemicals and Allied Products Export Promotion Council at Madras on August 31.

While Mr. N.B. Patel, national chairman of the council, commended the southern region for contributing towards improvement in the performance of exporters under the council. The regional chairman, Mr. S. Vedam, said that the large reserves of iron ore, barytes, quartz, feldspar and granite in the region could not be exploited fully for policy shortcomings.

Mr. Vedam was particularly critical about frequent changes in leasing policies in many states, non-renewal of existing leases and dishonouring com-

mitments given to industry on leases and renewals. He also cited lack of standardisation of royalties and dead rents, stringent transport rules, preventing transport of rough blocks weighing over 10 tonnes, prohibition on inter-state movement of granite blocks, insistence on setting up granite factories in every state, even for small quarries, and denial of tax benefits under section 80 HHC as the other constraints.

South India could improve on its record of contributing 60 per cent of the country's plywood exports if permits were issued more freely for export of sawn timber from exclusively imported wood with a value addition of 25 per cent. Mr. N.B. Patel noted that exports under the council had recorded a 55 and 40 per cent increase in 1988-89 and 1989-90 respectively, against the overall export growth rates of 28 and 26 per cent for the two corresponding years. In fact, the targets for 1988-89 and 1989-90 have been exceeded by 30 per cent and 10 per cent, respectively.

South India's share was Rs. 270.7 crore in the national figure of Rs. 1,028.05 crores in 1987-88, Rs. 371.8 crores in Rs. 1,594.7 crores in the following year, and Rs. 459.4 crores in Rs. 2,228.7 crores in 1989-90. The region is expected to increase its contribution by another 24 per cent to Rs. 570 crores in the current year.

Welcoming the long-term exim policy, Mr. Patel emphasised the need for deliberate efforts to create exportable surplus and aggressive marketing. Exploitation of developed and third world markets has so far not been sufficiently innovative, he said suggesting collective publicity campaigns.

Mr. Patel felt the real hurdle to promoting exports was the nagging problem of delay and differing perceptions of various government departments regarding export policy and assistance. The conference was inaugurated by Mr. S.S. Barnala, Governor of Tamil Nadu.

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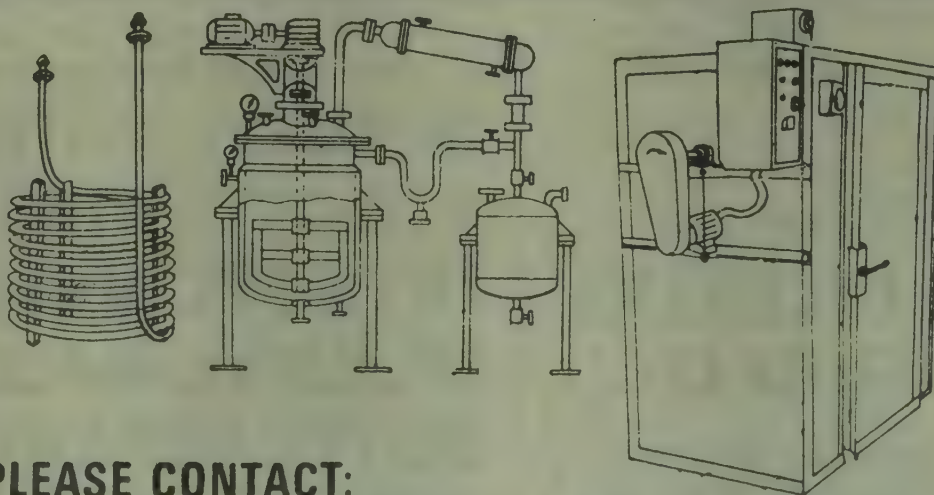
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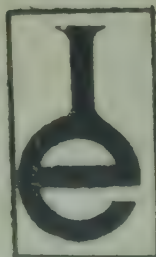
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## SPOTLIGHT ON

# Biotechnology & Life Sciences (Part 2)

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## DU PONT OUTLINES GENE INSERT BREAKTHROUGH

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Researchers at Du Pont and Duke University (North Carolina) have recently demonstrated a method of inserting genes directly into the DNA of specific animal cells by achieving genetic transformation in the skin and liver cells of live mice. The development offers the potential to treat genetic disorders.

The research teams employed a particle delivery system, Biolystic, developed by Du Pont to insert genes encoding the protein luciferase into the DNA of selected tissues. The animal's biosynthetic systems produced this protein, which does not naturally occur in mice.

Luciferase is an enzyme that occurs in fireflies and causes them to glow at night. This property allowed the researchers to verify their work easily. Traditionally, to create a transgenic animal, cells are removed and transfected with foreign DNA, cultured and reintroduced into the animal. Genetically modified retroviruses are usually employed from transfection because they introduce their DNA into that of the cell.

However, using Biolystic, only the DNA of interest is inserted into intact cells and not that of the retrovirus. In addition, it is specific to target cells and carried out in situ. The technique employs gold "micro-carriers", 1.1 micron diameter particles coated with the genetic material, to insert the DNA into the cell.

These are accelerated on a larger micro carrier in a stream of helium gas. The microcarrier is stopped before it enters the animal tissue, firing the microcarriers into the cell. Genetic

material can be inserted into the ears, thighs or, via surgery, into the livers of mice.

The next step, according to researchers, is to insert a therapeutically useful gene into animal liver cells. (*ECN*, 6/25/90, p. 24).

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## MYCOGEN REPORTS NEW BACILLUS THURINGIENSIS STRAINS

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Discovery of novel strains of the bacteria *Bacillus thuringiensis* (Bt) that are toxic to plant parasitic nematodes has been reported by Mycogen Corp. of San Diego, California. Mycogen researchers have developed a novel test that is capable of identifying Bt biotoxins effective against these pests. Patents have been filed covering these discoveries.

The new biotoxins will most likely reach commercial markets in plants genetically engineered to be resistant to pests, according to Mycogen. The company is considering pursuing a collaboration with a company that has strong plant genetic engineering technology. (*Farm Chem Intl*, 11/1989, p. 78).

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## A NEW RAPID TEST FOR DETECTION OF RABIES VIRUS

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An improved test for rabies detection has been recently reported. This involves a rapid cell culture technique for confirming the presence of the rabies virus.

In the new test, the rabies virus is grown in cultured mouse neuroblastoma cells, eliminating the need to confirm weakly positive fluorescent antibody test results by inoculating mice with clinical specimens and waiting for signs of infection. The main advantage of the new test besides reduced cost, is speed, as it provides results within 4 days,

instead of taking up to 30 days. The new test was developed by Robert Rudd and Charles Trimarchi of the New York State Dept. of Health, Albany, New York. (*J. Clin Microbiol*, 27: 2522-2528).

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## A NEW MAb-BASED RAPID TEST FOR DETECTING PERTUSSIS

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A new test based on a monoclonal antibody (MAb) detects small quantities of the tell tale pertussis toxin produced by the pathogenic bacteria *Bordetella pertussis*. The new MAb-based test for pertussis uses an enzyme linked immunoabsorbent assay, configured as a dot blot test. The procedure is sensitive enough to detect 10 mg of pertussis toxin. Moreover, the test is highly specific.

In a preliminary clinical study, undiluted nasopharyngeal aspirate specimens from confirmed pertussis patients gave 100% positive reactions in the assay. These studies are the first direct demonstration that pertussis toxin is produced and secreted into (such) secretions of pertussis patients at levels detectable by immunoassays.

The test was developed by Richard Friedman, Suzanne and James McMillan of Univ. of Arizona (Tucson). This alternative MAb-based test can be conducted directly on patients specimens and eliminates the need for a culture step. (*J. Clin Microbiol*, 27: 2466-2477).

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## THE WORLD'S FIRST EVER BACTERIA PRODUCED SURFACTANT

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A new surfactant produced for the first time by bacterial fermentation looks promising as an ingredient in household and personal care products where 'natural', non-toxic and biodegradable are attributes that will set them

apart from the crowd. This new yet-to-be named glycolipid was developed recently by researchers at the Univ. of Illinois (Chicago) and has been licensed exclusively to a start-up firm Petrogen Inc (Arlington Heights, Ill), which sponsored the development project.

The glucolipid surfactant has a wide range of potential applications that are being pursued by Petrogen. In the event of an oil spill, it could be sprayed on a beach, preventing the stick from sticking and forcing it back to sea, where it could be more easily cleaned up. It has also been tested in a sludge clean up application in a crude oil tank. In this use a water-sludge-crude oil emulsion is formed with the surfactant, allowing the oil trapped in the sludge to be recovered while reducing the sludge that must be disposed off.

Potentially more lucrative, however, are consumer products market. The product has potential in many other emulsifier applications, reports Petrogen, given its natural origin and its biodegradability. Potential markets include detergents (dishwashing and laundry), personal care products such as cold creams, food emulsification and metal treating. All these applications can open up provided the price of the surfactant is brought down with large scale production and the benefits of bacterial straining improvements. (*CMR*, 6/4/90, p. 23).

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#### CALGENE RESEARCHERS CLONE A GENE FOR A KEY ENZYME IN THE FORMATION OF VEGETABLE OIL

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Researchers at Calgene Inc (USA) recently described as a major technical achievement, their success last May in cloning a gene for a key enzyme in the formation of vegetable oils. The cloning of the gene for the stearyl ACP desaturase enzyme will open the door to the production of high value oils uniquely tailored to meet specific edible or industrial needs, Calgene researchers report. The desaturase enzyme plays

a critical role in determining the ratio of saturated to unsaturated fatty acids in vegetable oils. Thus, Calgene scientists expect that increasing stearyl ACP activity will result in vegetable oils with a reduced concentrations of saturated fats. And since saturated fats are known to cause blood cholesterol levels to increase, reduction of those fats directly translate into healthier edible vegetable oils.

The Company initially plans to enhance the expression of the desaturase enzyme, with the assistance of a proprietary promoter, in canola. Incidentally, Calgene has been heavily promoting canola oil in USA in recent years as one of the healthiest of all vegetable oils, with only a 60% saturated fat content even in the natural state. Ultimately, this manipulation of the canola seed should lead to the production of an entire family to genetically engineered and nutritionally enhanced oils. Calgene researchers will be evaluating engineered canola plants for altered saturated fats composition in the summer of 1990, and expect to field test the most promising lines in 1991 as part of their research plan for genetic engineering programme for canola.

Production of the new canola oil formulations will be accomplished through the interplay between the stearyl-ACP desaturase enzyme and a number of other oil synthesis genes, which the company is still in the process of cloning. The researchers expect over the next several months to complete work on series of different genes. Calgene has already successfully cloned one ACP gene which plays a major role in oil synthesis. Also, it has been able to transfer canola genes, and has developed seed specific promoters, which limit gene expression to the developing seed where oil is produced and stored. Specific field tests are slated for 1991, however, a number of other steps must be taken before these new oils are produced in commercial quantities. For instance, after proving it can replicate in the field

what it has accomplished in the greenhouse. Calgene will have a number of regulatory hurdles to vault. Regarding oil production for industrial uses, that means winning the approbation of US Dept of Agriculture. And on the edible side, the FDA's regulatory obstacle course will have to be negotiated. Calgene is looking at 1994 or 1995 before it can see wide scale production. (*CMR*, 5/28/90, p. 10).

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#### GREENHOUSE EFFECT OF FUELS COMPARED

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To minimize global warming, natural gas is preferable to other fossil fuels if leakage can be kept to a minimum, reports Henning Rodhe, professor of meteorology at Stockholm University.

The contribution of various gases such as carbon dioxide and chlorofluoro-carbons to the greenhouse effect can be calculated from their radiative properties and atmospheric concentration. Rodhe's analysis shows less carbon dioxide is emitted per unit of usable energy when methane (natural gas) is burned than when coal or oil is burned. However, the net contribution to global warming, must take into account spillage of methane — itself a powerful greenhouse gas — from pipelines and storage tanks. A switch from oil to natural gas would be justified on global warming grounds if leakage can be limited to 3 to 6% Rodhe concludes. (*C & EN*, 6/11/90, p. 20).

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#### BIOTECH, MATERIALS ABSTRACTS PICK UP AT CAS

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Five year data from Chemical Abstracts Service confirm what was already suspect. Scientific activity in biotechnology and materials science has picked up dramatically in recent years. An analysis of the number of abstracts in certain subject sections of the CAS data base from 1984 to 1989 shows section 3, Biochemical Genetics, has nearly doubled in total number of abstracts, a 92% increase.

The number of abstracts in Section 57, Ceramics increased 70%. Almost 24% from 1988 to 1989 alone. Other areas showing growth of more than 30% during the period include immunochemistry (34%), fermentation and bioindustrial chemistry (36%), terpenes and terpenoids (36%), unit operations and processes (48%), essential oils and cosmetics (53%), surface chemistry and colloids (34%), radiation chemistry, photochemistry and photographic and other reprographic processes (45%) and electric phenomena (46%). (*C & EN*, 6/11/90, p. 20).

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### FIELD TEST UNDER PROGRESS FOR GENE-MODIFIED CORN

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Field testing of genetically engineered corn plants was begun last June at Bio Technica Agriculture's corn breeding stations near Lisbon, Iowa following USDA approval of the test. The test is designed to study growth of the transformed corn under field conditions and to gather environmental data for use in future tests, the company reports. Bio Technica announced last January that company scientists had demonstrated that corn plants possessing an introduced gene were stable, fertile and capable of transmitting the gene to the next generation.

The Overland Park, (Kansas) company is developing corn, soybean alfalfa and wheat plants genetically altered for improvements such as insect resistance and enhanced yield or nutrition. It has conducted several other field tests, including one last year with tobacco plants modified to contain a gene encoding high levels of the essential amine acid lysine. The gene is being introduced into corn in order to produce high-lysine corn hybrids. (*C & EN*, 6/11/90, p.20).

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### DU PONT TO MARKET BIO INSECTICIDE

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Du Pont plans to market Nordick's biological insecticide based on *Bacillus*

*thuringiensis* (trade name Biobit), through its agricultural products group. The agreement between Du Pont and Novo Nordisk (Denmark) will allow Du Pont to distribute and market Biobit throughout the USA for insect control on fruits, vegetables, cotton, soybean and alfalfa crops in wettable powder and flowable concentrate under the Novo Nordisk brand name. The Danish company retains the right to directly market its products for application in forestry and public health markets. Du Pont reports that Biobit is highly effective when applied with its Lannate, Asana XL and Vydate L chemical insecticides as part of an integrated pest management programme. (*C & EN* 6/17/90 p. 7).

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### BIOTECH COMPANIES BECOME VIABLE ENTERPRISES, OFFER STOCK IN USA

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Mycogen (San Diego, USA) company is expanding its previously announced public stock offering from 1.7 million to 2.5 million shares. With an offering price of \$17.75 per share, the more than \$44 million offering will give the company capital to support development and commercialization of its biopesticide products.

Another agricultural biotech company, Crop Genetics International has filed with the Securities & Exchange Commission for an offering of 2 million shares of convertible exchangeable preferred stock. The new stock issues in this company will be convertible to common stock at any time and redeemable by the company after June 1992. Proceeds will be used to support R & D and commercialization of the company's plant vaccines and herbicide products.

Another biotech company Repligen (Cambridge, Mass) plans to sell 2 million shares of common stock. Most of the shares about 1.23 million, will be offered by Centocor with the remaining 775,000 offered by Repligen. Centocor

is selling its interest in the company to provide fund for its own business. The above development in USA indicates greening of biotech business and depicts growing confidence of biotech companies toward financial viability. (*C & EN*, 6/11/90, pp / 7-8).

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### MYCOGEN ANNOUNCES COLLABORATION WITH S.C. JOHNSON & SONS TO DEVELOP BIOLOGICAL PESTICIDES AGAINST HOUSEHOLD PESTS

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Mycogen, an agricultural biotech firm based in San Diego, USA has recently announced their collaboration with S.C. Johnson & Sons (Racine, Wis) — a manufacturer of consumer products including commercial insect control product — for a joint R & D for developing biological pesticides against household pests. Johnson will provide Mycogen with research funding. This with Johnson, will give Mycogen with research funding. This with Johnson, will give Mycogen its entry into the retail household pest control market. (*C & EN*, 5/21/90, p. 9).

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### A PEPTIDE DESIGNED TO ACT LIKE ENZYME

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A peptide with esterase activity similar to that of the serine protease chymotrypsin has been designed by adding a series of catalytic amino acid residues to a synthetic peptide. Biochemists Karl Aakin and his colleagues at the Univ. of Colorado, Medical School, Denver, point out that 'adding an enzyme like constellation of catalytic amino acid residue to..... synthetic peptides had not been previously accomplished'.

Using computer modeling, the research group designed a bundle of four parallel, alpha-helical peptides and added three residues found in serine protease catalytic sites to one end in the same arrangement as in Chymotrypsin; Also included were an 'oxyanion hole' and substrate binding pocket for ester substrates. (*Science*, 248, 1544, (1990).

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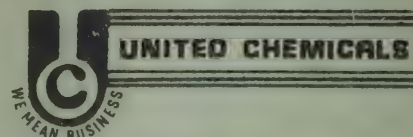
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## Science Briefs

### BOOST TO OCEAN ENERGY

The long-standing proposal to tap non-conventional source of ocean energy for power generation is expected to get a fillip with a joint team of the Tamil Nadu Electricity Board and the Ocean Energy Cell of Indian Institute of Technology, Madras, commending the offer of the U.S. based firm Sea Solar Power (SSP) to set up six Ocean Thermal Energy Conversion (OTEC) plants of 100 MW capacity each along the Tamil Nadu coast for serious consideration and recommending the setting up of one plant to begin with at Kulasekarapatnam area.

The Department of Non-Conventional Energy Sources has proposed to have a meeting at Madras shortly with representatives of the Tamil Nadu Energy Development Agency, the TNEB and other experts to consider various aspects of the project and decide on future course of action.

According to the joint report of the TNEB and IIT Ocean Energy Cell, the OTEC is a viable alternative for the future. Even though the cost of power from OTEC may not be cheaper than that of hydro and other conventional sources today, there is an immediate need to develop this technology. The proposal of the American firm to install OTEC plants may be given serious consideration provided their investment and other conditions are acceptable, the reports say.

Since detailed oceanographic data collection along the South Indian coast to choose a new site for the proposed plant may require at least one more year and involve a cost of a few crores of rupees, the joint team has recommended that further data collection for locating the exact site may be limited to Kulasekarapatnam area. The operation of the OTEC plant will facilitate collection of all relevant data to finalise the environ-

mental impact of OTEC plant gets operational in the future.

Kulasekarapatnam has been preferred by the team after evaluating three other areas, namely Marakkanam, Pondicherry and Cuddalore. One of the main reasons for this is that Kulasekarapatnam in the Gulf of Mannar is free from cyclone havocs and meteorological disturbances, whereas the other three are perpetually prone to storms. From a number of other criteria like sediment drift rate, sediment distribution, geology and profile of sea bottom, Kulasekarapatnam has been favoured.

Generally, Southern India is found to offer many possible locations for OTEC plants because the surface temperature of sea water along the coast of Tamil Nadu is about 25 degrees C throughout the year. Moreover, Tamil Nadu is a power deficit State and lacks conventional sources like coal. The only source of thermal power it has is lignite and this is fully exploited. Hydel sources, too, have been fully exploited and there is little scope for new hydel projects.

Tamil Nadu's power requirements are projected to increase from 20,414 million units at the end of the Seventh Plan to 30,614 million units at Eighth Plan-end whereas the availability will increase from 18,107 million units to 27,055 million units. Thus, the deficit will rise from 2,307 million units in 1989-90 to 3,559 million units in 1994-95.

In the light of these projections, OTEC is considered a boon for Tamil Nadu. In fact, the TNEB had sent a proposal to the Central Government ten years ago to put up a 25 MW OTEC plant on the east coast of the State but this was not sanctioned. Meanwhile, the offer of the American firm came for putting up six OTEC plants of 100 MW each. Naturally, the Centre's response was lukewarm as no OTEC plant of such high capacity had been put up

anywhere. The OTEC plant at Hawaii is of 40 MW capacity, and the one in Nauru is of 100 KW capacity only. The Tahiti plant is of 5 MW.

The OTEC working group set up by the Department of Non-Conventional Energy Sources had designed a one MW OTEC plant and recommended setting up of such a plant in Lakshadweep island. As regards environmental aspects, it is pointed out that though in general commercial OTEC development may affect the atmosphere, the terrestrial environment, the marine eco-systems and various human activities in the vicinity of development and operation sites, the net environmental impacts from commercial OTEC development will be minimal as compared to impacts from fossil fuel and nuclear power production.

The capital cost per KW of power production is estimated at 1000 dollars for OTEC plant compared to 1100 dollars for oil-based, 2200 dollars, for coal-based, 2340 dollars for hydro and 2450 dollars for nuclear power. The fuel costs in the case of OTEC is practically nil. Moreover valuable byproducts are obtained from OTEC plants.

These include fresh water for irrigation and drinking, hydrogen and oxygen which can be used as feedstocks in manufacture of other products, ammonia that can be used as fertilizer and methanol that can be mixed with gasoline. If the value of the power and byproducts are added together, the annual income of a typical 100 MW plant can amount to more \$100 million.

Courtesy: Urja, August 1990.

### BIOLOGICAL AGENTS FOR CROP PESTS

Demonstration trials for the control of potato tuber moth was carried out very recently with biopesticide *Bacillus thuringiensis* (BT) variety *kenyae* in country type potato seed storage faci-

lity called Arani in farmers' storages sites at three villages in Pune district.

The scientists of Bio-chemical Group of Bhabha Atomic Research Centre (BARC) who developed this variety of BY and carried out the trials used the pesticide in the form of fine dust (100 g per quintal) in about 10 quintal storage. After three months the result showed a 95 per cent success. Earlier the efficacy of this BT was evaluated independently by the Entomology section of the College of Agriculture, Pune.

Potato tuber moth causes excessive damage to potato crop as well as to potatoes during storage especially in regions with warm climate.

Exactly a year back the Malaria Research Centre in New Delhi started an experiment where thousands of local and exotic fishes were released in mosquito-breeding waters across the country — to combat malaria. This is in accordance with a plan recommended to the Indian Council of Medical Research. Field trials in malaria-endemic areas have helped identify at least five species of fishes which feed on mosquito larvae breeding in streams, wells and stagnant pools.

Actually biological control of pests started exactly 101 years back. At that time a scientific strategy was developed to combat the dreaded cottoncushion scale insect which threatened to destroy the citrus fruit industry in California, USA. Scientists of the US Department of Agriculture accordingly released 129 imported Australian vedalia beetles into affected citrus groves on an experimental basis. The beetles effectively destroyed the pest and the pests never appeared again.

These are some of the instances to illustrate how an organism can be used effectively to resist the spread of disease-causing germs, insects, parasites and pests. The ambit of biological control, as this strategy is called, covers a

wide spectrum of approaches ranging from use of obligate parasites (which cannot survive outside hosts) to toxin producing micro-organisms, pathogens and non-toxic behaviour modifying chemicals.

Although in the last 100 years, there were some success stories of biocontrol measures, development of chemical pesticides have from time to time distracted the attention of scientists. In 1939 with the startling discovery of DDT, chemists realised they could fairly easily formulate new hydrocarbon pesticides. No one then foresaw any problems with these toxic substances (DDT was banned all over the world but India still uses it widely.) But by 1995, when people realised the damage caused to the ecosystem by chemical pesticides, the focus of scientific attention shifted to biological controls once again.

Now armies of bugs and microbes, their powers enhanced in some cases by genetic engineering, are being unleashed in fields and laboratories in a widening effort to control destructive agricultural pests without resorting to chemical pesticides. Although biological control accounts for only about one per cent of the 20 billion US-dollars spent globally on pest control each year, research in this field is rising sharply. There is a big information explosion. Ten years ago, only one per cent of 500 or so scientific papers presented at annual meetings of plant pathologists dealt with biological control today, 25 to 30 per cent do.

On one research frontier, scientists are isolating and mass-producing genes from one strain of bacteria that produces an antibiotic to kill disease organisms. They are transferring the genes to other varieties of bacteria, creating new strains that can use the same antibiotic. By such gene transfers, they hope to tailor-make micro-organisms that can control diseases in environments where none otherwise would, to enhance the potency of control microbes; to make a single strain of

microbe effective against more than one pest, and to design control microbes that will commit suicide after doing their job. In a parallel effort, they are also trying to incorporate disease-resistant genes in the crops themselves, and some of these agents are expected to be commercially available in the next five years.

The most common bio-control agent (BCA), in use world over, is the bacterium *Bacillus thuringiensis* (BT). This broad spectrum pesticide is being marketed by multinationals. Commercially, bacterial and fungal agents have displayed amazing potential for pest destruction, but problems invariably arise over their 'cost effectiveness', patentability and registerability.

The agrochemical industry believes that biotechnology development will increase the utility of BCAs, and is therefore, conducting 'in-house research' to advance it.

However, as Dr. A.R. Jestum of the Imperial Chemical Industries Plant Protection Division of Berkshire in the UK observes: "BCAs will not replace chemicals in the foreseeable future, but will complement them and allow the development of improved integrated control measures".

Some experts strongly believe that biology will eventually overtake chemistry as the predominant means of pest control. "It is going to have to", said Lester E. Ehler, a professor of entomology at the University of California, USA. But he also pointed out that "it is dangerous to rely solely on biological control because it doesn't always work." Ideally, Prof. Ehler and others including Dr. K. Raghu of BARC feel that biological controls should be used as part of an integrated approach that also involves crop rotation, new strains of disease-resistant crops and some chemical pesticides — with chemicals used sparingly, as a last resort. A microbe might work in one part of the

country but not another, or in one season but not another. Although biological agents tend to be more stable and longer-lasting, they generally do not bring about the dramatic kill that chemical pesticides can, rather, they hold pests within tolerable bounds. All this makes companies reluctant to stand behind guarantees.

In India, certain guidelines were recently formulated by the Government for the registration of the BT. But the authorities somehow, have not yet been convinced about the safe use of BT. Besides several Indian laboratories and agricultural universities are working on bio-control methods, but so far not much has been achieved in producing commercially viable products for the market.

The use of BCA requires re-education of farmers, growers and pest-controllers, so that they are convinced of not only using a better product but also a cheaper one. Nevertheless, one fact that cannot be ignored is that many microbial pathogens available today fail to meet international standards or the expectations of the agricultural industry.

Several strategies are thus being devised by the scientists working this field in a manner that does not damage ecosystems so that at least their social obligation towards protecting the environment from pollution and depredation is fulfilled.

## NAZI SOLUTION TO OIL CRISIS

As the world braces for a rerun of the 1973 oil crisis, scientists at Texas AM University are hoping they will get the chance to pore over documents seized after the fall of Nazi Germany in search of the forgotten secret of cheap synthetic petroleum.

Richard Wainerdi, a former AM professor who currently heads Houston's Texas Medical Centre, said he was convinced that the microfilm archive he

helped put together, contains the key that would enable developed nations to end their dependency on imported oil.

About 90 per cent of the documents have never been examined or translated since Wainerdi and his colleagues scoured institutions such as the West German record office, the Library of Congress, and London's imperial war museum to assemble the archive.

All the documents relate to the 25 plants that produced synthetic oil in Germany between 1936 and 1945, pumping 90 per cent of the Luftwaffe aviation fuel and 68 per cent of the military's other petroleum requirements into the Nazi war machine.

Texas AM professor Arnod Krammer said any sophomore chemistry student understands the process by which natural carbon deposits such as coal can be transformed into synthetic petroleum derivatives.

The trick, he said is to do it cheaply — or cheaper, at least, than the going price of the imported product which account for 54 per cent of the US oil consumption. The answer, he says, may have been literally under their noses all along.

"We are spending US \$28 million per day to protect the oil fields of the Gulf but it would take just one million dollars for us to put the information in these documents at the disposal of industry", Krammer said.

Funding for the project — dubbed Project Wassandra — was easy to come by in 1975, when Krammer, Wainerdi and their colleagues began gathering the documents.

Memory of many queueing up at petrol stations in the wake of the OPEC production squeeze of the early 1970s was then fresh and painful, but when world oil prices plummeted a few years later, the money for follow-through

research dried up. "Nobody learned their lesson back then", said Krammer, and insisted that it was ridiculous to keep the US economy artificially addicted to Arab oil.

What he was proposing was no pipe dream, he insisted, using only the basics of the Nazi-developed technology, US researchers built an experimental plant that produced a daily output of 200 to 400 gallons between 1949 and 1953.

The prices, "just over a cent and a half a gallon", Krammer claimed, adding that the information set out a long-forgotten official report prepared by the US Bureau of Mines.

"Nobody knows why the Federal Government abruptly withdrew its support but everything seems to point to big oil companies being behind the decision because they were not happy about the competition they were in for," Krammer speculated.

Moreover, some of the German scientists involved in the World War II project later emigrated to South Africa, where their expertise was used for secret installations producing 37 to 50 per cent of the oil consumed in that country from its extensive coal deposits.

The United States also has plenty of coal and much of it is in Texas, which could develop a synthetic oil industry on a scale to rival the boom the State has enjoyed from natural oil.

## M.S. NAGER, NEW IRE CHIEF

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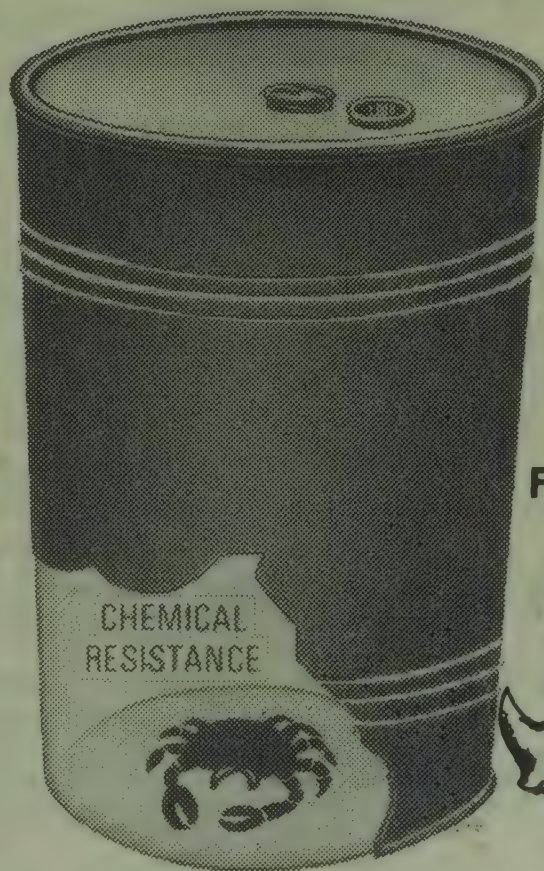
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# MATERIALS MANAGEMENT

## Part XVII - Surplus and their Salvaging

N.R. PAI

### Managing Surpluses -- Materials Managements job

To look into surplus materials, identify them and to dispose them off is the job generally assigned to the purchasing section of Materials Management department. This is because of the simple reason that this section is always in touch with the market, is aware of market positions and market fluctuations and hence it is in the best position out of all the management offices to dispose off surplus at the highest obtainable price. It is worth noting that all organisations have surpluses and hence their disposal is a universal problem in the industrial world. Therefore accumulation of surpluses should not be looked upon as a mark of inefficient functioning of an organisation. Again, sale of these surpluses does contribute to substantial amount of income. It therefore plays a significant role in the healthy functioning of any firm.

### Where from these surpluses heap up?

Well! They have several origins and each one of them contributes to their accumulation in a running organisation. The factors contributing to surplus accumulation can be enlisted as follows:

- a) Faulty manufacturing procedures
- b) Buying in excess of immediate foreseeable needs.
- c) Short storage life of material bought.
- d) Manufacturing processes becoming outdated and as a result the material bought becoming obsolete.
- e) Rough or bad handling especially of sensitive materials.
- f) Faulty storage.
- e) Faulty packaging.

For the purpose of study we can classify these origins of surpluses into the following broad categories:

### 1. Obsolescence

It is well-known that technology is advancing by leaps and bounds these days. As a consequence, many substances, materials or items that were once used as starting materials may become outdated and obsolete in due course of time. Their place will be taken by new raw materials which have an edge over their predecessors by way of their lower cost, better availability, by way of final product improvement or as a result of shortenings of the manufacturing process which then can be carried out with less number of steps, thereby stepping up production against time, a point which any pro-

duction manager would like to achieve.

The older raw material or previous spare or component parts thus become obsolete and need their disposal. So, the obsolete material is an undamaged, good material which is no longer in use because of process, design or model alterations.

### 2. Waste

It is a substandard material of poor quality which has no standing in the market if sold as such. It is a result of bad process supervision or reckless manufacturing where different parameters of production procedures are not adhered to properly, resulting in final product/s that cannot be passed by the quality control department, as they cannot come upto the customers requirements. Such products if sold as such would violate the contract terms and would lower the image of the manufacturing company in the eyes of the customer thereby spoiling buyer-supplier relationships which have long terms effects on the organisation's functioning.

Then there is another kind of waste that gets accumulated in a running organisation. To this class belongs: packaging material that is left after unpacking the goods received, waste papers, waste rags of cloths, unwanted wooden strips, blocks and chips and at times even saw dust. Then there are side cuttings from foam rubber and thermocole, glass-wool, corrugated card-boards which are used as stock absorbents in packaging. This typical non-metallic refuse that comes out on unpacking along with iron hoops and wires used in strengthening packaging, find no use in the organisation where they are generated but can be sold to the right customer after their proper segregation into separate classes to cash their value.

### 3. Scrap

Scrap is different from waste. It is a result of not utilising fully the raw material/s employed in manufacturing processes. There are hardly few manufacturing processes where raw material is used totally or to the extent of 100%. Scrap, therefore, is a regular outcome of most of the production processes. Examples that can be cited are: turnings coming out of lathe working, end cuttings of H-planks and I-girders from construction industries, side cuttings from sheets of metals, plastics, leather, cardboard, wood, foam-rubber, thermocole etc. They have their own value that can be cashed to the benefit of the organisation.

#### 4. Overexuberant purchasing practices

Sometimes forward buying or speculative purchases prove erroneous in the course of time. As a result material bought is in sufficient excess of the regular or even immediate future requirements of the company. Such material then does not have regular outlet through production system. As a consequence it unnecessarily blocks storage space and finance flow in terms of unneeded heaped up inventory. Organisation has to unnecessarily bear substantial holding cost because of the accumulation of such material due to the company's over-procurement policies. Their quick disposal is then necessary to release the funds they have blocked, which can be used for more fruitful purposes.

#### 5. Spoiled goods

To this class belongs damaged or spoiled items. The deterioration is a consequence of bad, careless handling or it may be because of the poor shelf-life of the product. The third possible reason is that conditions required for its healthy storage have been violated. This happens in case of thermally sensitive goods, which are required to be preserved at low temperatures, but which instead get exposed to higher temperatures due to faulty refrigeration. Sometimes, exposure to rain and excessive heat may lead to the rusting or to the spoilage of goods rendering them unfit for use.

#### 6. Outdated or spoiled machines, equipments, accessories or vehicles

Spoiled or damaged equipment, machines, their accessories or company vehicles which cannot be repaired or whose repairing cost does not justify their further utility for sufficient length of time, should be disposed off. Sometimes, as a result of technological advances, process innovation that is achieved calls for new machinery and equipment rendering the previous one useless and superfluous. Such items should then be classed as disposable goods and should be removed from the factory premises at the earliest.

#### Disposal of Surpluses and Salvaging

Surpluses in any of the above mentioned six forms should be salvaged. Salvaging amounts to disposal of organisation's goods at an economically sanctioned rate, since they are of no further use to the organisation. The first step in salvaging therefore amounts to identifying such goods.

#### Identification of surpluses

Surpluses can be identified by employing F-S-N classification described under selective inventory control in our previous communication viz. (Materials Management, Part VIII-Inventory and its Control (Contd), *Chemical Weekly*, 19 Sep. 1989, page 93). As described therein F-S-N stands for Fast

moving, slow moving and non-moving items respectively. An arbitrary rule often applied aims at disposing off any item which has been inactive for an year or so. These inactive non-moving items are easily spotted out by the use of computers. Such items are identified and disposed off periodically at the best available price. No doubt the computerised approach makes the process of spotting out quite easy and without the use of computers the procedure becomes cumbersome; however, even then it is very necessary to adopt this spotting out through manual working.

#### Decision to Salvage

The final decision to dispose off or to retain items classed as surpluses is now-a-days based on cost-benefit analysis. It can be with a mathematical approach. In case inequality (i) given herebelow holds good an item can be continued as an inventory; if not the item should be disposed off.

$$\frac{p(I)C}{HS} > 1 \quad \dots\dots\dots (i)$$

Here,

$p(I)$  = Probability of item utilization in an year's time.

$C$  = Stands for cost or market price of the item.

$H$  = Cost of holding the item for an year.

and  $S$  = value of the item if salvaged immediately.

#### Advantages of salvaging

- i) Funds locked in inactive items are released for better use.
- ii) Space occupied by these non-moving goods is set free for more profitable use. Space is quite costly these days and it should be skillfully utilised to get the highest advantage.
- iii) Any further spoiling or deterioration of the goods which is salvaged immediately, is avoided.
- iv) The spoiled material can contaminate surrounding goods and spoil them in turn. Salvaging prevents it in time.
- v) Losses on surpluses can attract tax rebate.
- vi) Salvaging adds substantially to the organisation's income.
- vii) In case the surplus in the form of waste is too much, production department can be summoned to look into the excess waste. The reason may be bad supervision, faulty machines, improper processing etc. The faults can be identified first and then promptly rectified so that further losses by way of wasteful production are avoided in time.

#### Collection of surpluses

This is one of the important aspects of salvage operations. Items and materials of the same type should be collected at one place. They should be stored properly and handled care-

fully like raw materials, since they represent money locked up. Scrap of one kind should be separated carefully from other scrap and preserved in coloured containers. Each type of scrap should have a separate colour code for preserving it and it should be seen that it does not get mixed with the rest of the surpluses. Thus for example all iron turnings should go in red containers while brass chips should be preserved in yellow boxes and aluminium side-cuttings should be collected in white bags. It is important to note that scrap when mixed with other types of scrap does not fetch much value. On the other hand, segregated scrap can be easily sold at a handsome price.

Again, handing over the scrap to the buyer directly from the department where it is generated reduces material handling charges. It is therefore better to ask the purchaser to collect scrap periodically from operating department or workshop floor, if that is possible. As mentioned earlier waste in the form of unwanted packaging material obtained after unpacking of goods also fetches a good price, if collected, segregated and preserved properly prior to its sales.

### Routes of surplus disposal

#### 1. Utilizing surpluses within the organisation or in its sister concern

This can be better explained with an example. Consider an organisation manufacturing heavy leather items like travel bags, suitcases etc. It can send the side cuttings to sister concern manufacturing light leather items like leather belts, leather purses, dog collars, skating straps, watch straps etc. Similarly a company engaged in the manufacture of heavy metal items can utilize its side cuttings for engraving beautifully designed novelty items or even name plates. Utilizing scrap in this way fetches prized income for an organisation.

#### 2. Selling to the supplier

It is true that no organisation can expect its purchase-man to be always on the right side of the market, however efficient he may be. Mistakes do occur. Goods are purchased for needs that may not materialise. Sometimes goods requirements is overestimated. At times manufacturing programmes alter. Company may also go in for over-exuberant purchasing practices. All this may result in accumulation of excessive stocks, and their disposal becomes a "must" to release the money and space they have blocked. The best way of disposing off such goods is to sell them back to the supplier. Generally upto 90% of the price can be recovered that way. Good buyer-seller relationship is very helpful for this method of disposal.

#### 3. Selling to another firm directly without involvement of a broker or a dealer

This is the next best source for disposal of surpluses. For

example, scraps generated in an organisation may not have any use at the place where they are produced. However, quite likely, they can be employed as raw materials in other firms. Thus copper turnings generated in an engineering firm or pickling liquor from a firm manufacturing copper cables can be sold to a chemical firm manufacturing salts like copper sulphate for a handsome price. Iron scrap has generally two main outlets. It can be melted and reprocessed into iron ingots or else it can go for production of iron salts.

#### 4. Selling as seconds

Sometimes during production product produced carries a very nominal defect. It then cannot be classed as waste. However, its quality is not upto the mark to keep up the prestige of a prestige-conscious company. The best way then is to sell such products as "seconds" at a reduced price in an open market where the purchaser is told about the defects which are compensated for by the reduction of its actual market price.

#### 5. Selling through a dealer or a broker

Many old items like B/W T.V. sets, second-hand radio sets, used transistors, might have become outdated in cities. But they can be sold in remote villages after repairs, if needed, at a comparatively good price. Old B and W T.Vs from cities thus do find good market in villages. Old models of automobiles also come under the same category. Since a dealer or a broker knows the market his help can be sought for their disposals.

Apart from the above mentioned items, scraps, wastes etc. can also be sold through brokers when their direct selling to other firms is not possible.

#### 6. Making employees as customers

This is one more line open for disposal of surpluses. Drums and metal or thick plastic containers can be sold to the employees after their contents are exhausted. Often they are used for household water storage. The goods which otherwise would go as seconds in an open market can also be sold to the employees at concessional rates. That way company has a ready buyer while employees gets the goods at a cheap price. Both are benefitted. It also helps in building employer/employee relationship.

#### 7. Discarding

If none of the above lines are open for disposal, surpluses can be just discarded to free storage space or any other organisational space they are occupying. This space can then be used in a more fruitful manner for some other valuable storage. This procedure is often adopted in advanced countries like USA. Even items which may fetch sufficient price in our country (for example newspaper waste) goes as a regular garbage there.

## Reducing Surpluses

Sometimes it is possible to reduce surpluses. Waste due to faulty production can be minimised or even eliminated by introducing better supervision (especially at sensitive production steps) or by repairing faulty machines or even by replacing outdated worn out equipment that is employed in processing.

Again, amount of scrap can be reduced by resorting to exact specification to suit one's requirements. Thus, in case of building and construction companies, if I-girders, H-planks or wooden beams are ordered to their exact, required length, there will be no end-cuttings which would otherwise go as scrap. In metal pressing industries, sheets of metals that are used as raw material should be ordered with such accurate specifications that maximum number of useful cuttings can be had from them, thereby reducing to bare minimum the scrap due to side cuttings.

## Dealings with surplus purchaser

It is always advisable to show the buyer the scrap or waste one intends to sell. He may examine it in his own way if he wants. This would certainly avoid future misunderstanding with him.

To get the best price one can even enlist probable buyers and ask for quotations from them. Before entering into actual contract for disposal of surplus, it is better to clarify terms of contracts like delivery schedules, "who will bear transport charges?" "How quality would be determined?" "How quantity would be ascertained?" i.e. "which procedure would be followed to fix weight of the material to be sold?". In case discrepancies (like shortfall in weights or excesses in weights) arise how will they be tackled. How and when payment will be effected. Sometimes penalty clauses are introduced in the terms of contract to avoid delay in surplus removal, delay in payment etc.

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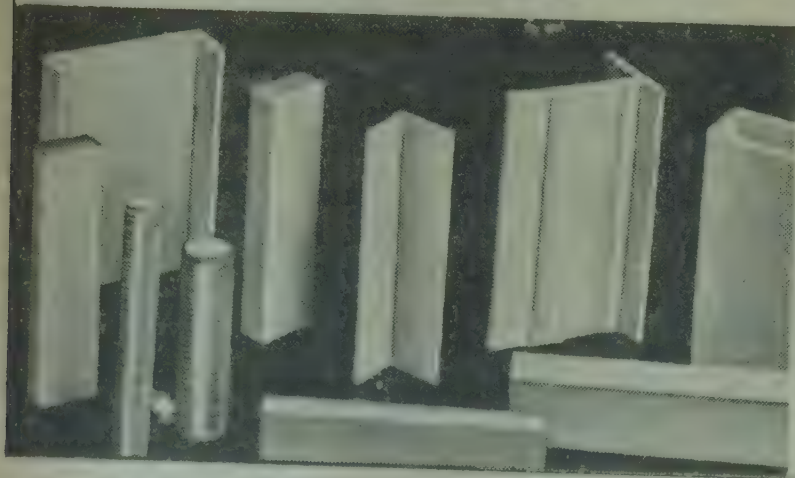


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# Sickness in small and medium scale chemical industries

N.S. VENKATARAMAN\*

Rarely a day passes without the advertisements appearing in newspapers about the offer of sale of sick industrial units. One or the other state industrial financing institutions occupy considerable space in the newspapers almost everyday, bringing out a big list of units available for sale, that have failed to repay the term loan to the institutions. In short, industrial sickness in India has become a fact of life, as much as human sickness is. Such sickness in chemical industries is particularly conspicuous, since the chemical industries appear to be more prone to sickness than others and it is often contributed by multiple factors, making even the task of diagnosis of the cause of sickness very difficult, apart from working out suitable and adequate prescriptions.

Though the Government has recognised the seriousness of the problem and evolved various machineries to overcome the industrial sickness through institutions such as BIFR, IRBI and others, most of such measures have only ended up in carrying out the post-mortem, instead of avoiding the sickness itself. On a more careful scrutiny, it would become evident that what the Government can do in such cases is little and the initiative has to come necessarily from the promoters of the industrial units themselves. The system and the structure of the Governmental methods and procedures are such that the Government machinery is ill equipped to handle directly the crisis of industrial sickness, which requires quick decisions and initiative. Any attempt to speedup the Governmental procedures have only resulted in the relaxation of the system of check and control, which is very necessary in the Governmental departments, to avoid nepotism, corruption and misuse of funds. Further, the solution to the problem of industrial sickness would require high level of specialisation, expertise, and micro level knowledge and awareness of the various complicated factors, which is unlikely to be available with the Government departments. It is high time that every one realises that the responsibility for tackling industrial sickness should only remain with the management and the promoters of the industrial units, without expecting any high level of contribution from the Government sources. The Government is to govern and not to do business and tackling the problem of industrial sickness mainly concerns the business of running the enterprises.

A careful analysis of the sick chemical units would reveal the fact that most of such units are almost born sick and the causes of the sickness are built into the units themselves, at the project conception stage itself. The irrelevant background

of the project promoters and the inadequate project appraisal, particularly in the case of small and medium sector, have been found to be the chief cause of sickness in several units. In the SSI sector, the promoters have to combine within themselves atleast the broad knowledge, to manage several portfolios like finance, production, marketing and, of course, the Government departments/financing institutions, since the SSI sector cannot afford to employ specialists in various fields to manage the show. The choice of project that has no relevance to the background of the entrepreneur is certainly a major cause for sickness in small and medium sectors. A number of cases can be cited, where persons with agricultural background promote metallurgical units and persons with civil engineering background put up chemical projects, which invariably make them face problems in the units, which they find extremely difficult to manage. Most of such persons learn their lessons at a heavy cost and finally, when they understand the solutions, they are left with neither energy, enthusiasm nor resources to solve the problems.

Nothing can be a substitute for experience in industrial management. The industrial problems not only involve technological and trading factors but also factors relating to human management and public relations. A mere knowledge of technology alone on the part of the promoters has been found to be inadequate, just as mere capability in public relations alone cannot take an entrepreneur beyond a level. One has to get a lot of practical knowledge and experience in a hard way, before becoming an adequate industrial entrepreneur in a small and medium scale chemical industry. A number of cases can be cited, where the units have become sick even after producing good quality product, simply because it is unable to deal with the market/dealer mechanism. In the case of a number of chemical products, dealers control the market forces due to their "money and staying power" and the manufacturers find themselves at the mercy of the dealers. No textbook could teach the entrepreneurs adequately regarding the manner of dealing with such situations, which may be different from product to product, place to place and person to person. Prior experience in dealing with the market mechanism for the particular product can be a very good asset to the entrepreneur. When young persons, with degrees and diplomas in engineering and management subjects, put up chemical units with enthusiasm on the basis of the knowledge acquired from the classrooms and textbooks, they often find themselves in terrible situations when confronted with the problems posed by unscrupulous market operations like over/under invoicing, adulteration, hoarding/artificial crea-

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tion of scarcity etc. It is high time that the financing institutions also recognise the importance of the relevance of the background of the entrepreneur and the need for their adequate experience, before extending financial assistance to small and medium scale chemical units. The present method of chemical project appraisal based only on the projected internal rate of return of the project and source of technology alone often lead to wrong decisions.

The inadequate assessment of the various factors involving technology, process yields and quality levels has lead to sickness in several chemical units. The case of units that have come to grief, due to the use of technology hitherto unproved in commercial scale plant are well known. Even the know-how provided by several CSIR laboratories have failed in many cases in commercial plants. While it may not be possible to get commercially proven technologies all the time, atleast enough precautions must be taken to overcome the possible teething technological problems, by way of mental and financial preparedness.

Of the many small and medium sick chemical units, it can be seen that most of them have become sick even within six to twelve months of commissioning the projects. It is also common to find that such units blaming the banks and financial institutions for their problems, in view of the heavy delay in processing the applications for financial assistance and release of the funds, which result in project cost escalation. The banks have particularly been blamed for impractical methods adopted by them for assessing the working capital requirements and often slashing down the working capital figures for the projects, from the original figures mentioned in the applications for assistance. In their anxiety to commission the plant, small and medium entrepreneurs often accept meakly the sanctioned working capital loan and commission the plant, hoping to persuade the banks to see reason later on and raise the limits after sometime. But, such work-

ing capital constraints have often proved to be disastrous for the new chemical units, especially when they have to face teething problems in stabilising the process operations and product quality level and tackling the market forces adequately. When such units, facing the problems and realising the urgent need for further working capital, approach the banks for assistance, the bank officials, often without adequate expertise and understanding in the relevant field, take unduly longtime to give their decisions, by which time the units may became hopelessly sick. It is no surprise that such units think that the problem of tackling industrial sickness is largely the problem of tackling the banks and financing institutions. The sure way to avoid the sickness in small and medium chemical units is to adequately appraise the projects before launching them, both by the promoters and the financing institutions. The inadequate project appraisals is certainly evident in all the chemical units that have become sick. The technology assessment, clear understanding of market mechanisms, proper assessment of working capital requirements, careful time schedule for project implementation and the fund release by the financing institutions have all become very vital factors in deciding the long term health and prosperity of the units.

Just as in the case of human sickness, prevention is better than cure in the case of industrial sickness also. The cure, in the case of chemical units, often becomes impossible due to the rising cost of machinery and inputs and the fast changing technological scenario. Under such circumstances, the organisations like BIFR, IRBI and others find themselves in "dead locked situations" most of the time, in their attempts to revive the sick chemical units. They often find that the problems of the sick units are due to fundamental factors and most of such units are born with potential sicknesss. Like the advocated 'mercykilling' in the case of sick human beings, the BIFR also often recommends that the sick units should be liquidated without even attempting to revive them.

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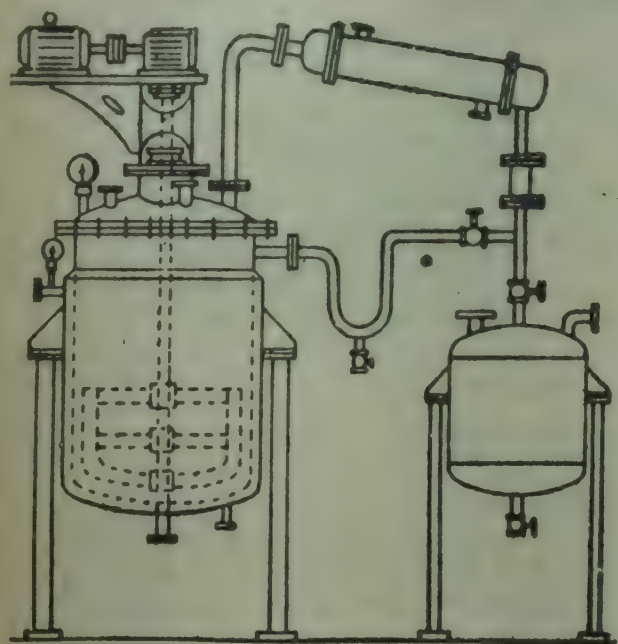
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# Assessment of the Inter-Relationships between the various specifications of LAS

R. RAMU, C. RAMANATHAN & S. MAHESH KUMAR\*

## SYNOPSIS

This paper titled "Assessment of Inter-Relationships between the various specifications of LAS" primarily deals with the assessment of Active Matter, Free Acid and Free Oil based on yield. This helps the acid slurry manufacturers in assessing their process. An acid slurry manufacturer can gauge his process before start-up itself in the sense that he can approximately calculate his yield from the amount of water he is intending to use and from that yield, he can calculate the other specifications. This also helps in many trouble-shooting problems in slurry manufacturing units in the sense that if the manufacturer starts practicing the usage of these equations, he will in a period of time be in a position to know what essential parameters really control the process and when trouble arises, he will know what has caused the problem. When one finds, wherefrom the trouble has arisen, 80% of the trouble-shooting is completed. The rest 20% is a comparatively easy task of just putting into action the necessary remedies.

## Introduction

In the manufacture of Linear Alkyl Benzene Sulphonic Acid, it has become a general practice in small scale industries to assess active matter, free acid and free oil in terms of their percentages in yield. IS 8401 1977 gives the following specifications for alkyl benzene sulphonic acid (acid slurry).

Characteristics	Requirement for Type 1	Type 2
Active matter as alkyl benzene sulphonic acid, per cent by mass, min.	93	85
Free alkyl benzene, per cent by mass, max.	2.0	2.0
Free sulphuric acid per cent by mass, max.	2.0	9.0
Colour of 10 per cent alcoholic solution (mass by mass) in 1/4" cell on Lovibond Tintometer, not darker than	3Y+0.5R	5Y+1R

This extract deals with the inter-relationships of the Free Acid, Free Oil, Active Matter, Yield, Percentage dilution water etc.

## The Initial Approach

Before we proceed further, it is essential to define all the terms that are to be used in this extract.

1. *Y -- Yield:*  
This is the ratio of the product out and the LAB in.
2. *AM -- % Active Matter*  
This is the per cent of Linear Alkyl Benzene Sulphonic Acid in yield.
3. *FA -- % Free Acid*  
This is the per cent of Free Adhering Sulphuric Acid which is not washed off by water in yield.
4. *FO -- % Free Oil*  
This is the per cent of oily matter, i.e., the unsulphonated part of LAB in yield.
5. *W -- % Dilution Water*  
This is normally the amount of water used for washing the slurry. It is generally denoted in terms of kgs. of water per kg. of reaction mixture x 100.

## Specimen

Say, for a LAB input of 1 kg, a dilution water of 0.22 kgs. is used where the sulphonating agent oleum 1.2 kgs. is used. The product acid slurry is 1.5 kgs. and the 100% LAS formed through the reaction is 1.3139 kgs. and the Free Oil is 0.02 kgs. and the Adhering Acid is 0.1088 kgs. The report is as follows:

Reaction mixture	= 1 kg LAB + 1.2 kgs. Oleum = 2.2 kgs.
Water	= $0.22 / 2.2 \times 100$ = 10%
Active Matter	= $1.3139 / 1.5 \times 100$ = 87.59%
Free Acid	= $0.1088 / 1.5 \times 100$ = 7.25%

\* Marketing Development Cell, Tamil Nadu Petroproducts Ltd., No. 6, Nungambakkam High Road, Madras 600 034.

$$\begin{aligned}\text{Free oil} &= 0.02 / 1.5 \times 100 \\ &= 1.33\%\end{aligned}$$

In the manufacture of acid slurry, there are typically two stages, one is the reaction stage and the other is the separation stage. In the reaction stage, the active part of the yield, i.e., Linear Alkyl Benzene Sulphonic Acid is formed and in the separation stage, the Adhering Acid is washed off with the help of water.

Therefore, in our terms, the AM is formed in the first stage and the FO comes along with it. The FA is the resultant of the second stage where W actively washes off the acid resulting in some typical value of FA.

### The Proportionalities

It is vivid that higher the W, lower is the FA and lower the Y. Hence, we can arrive at typical proportionalities as follows:

1. Water is inversely proportional to Free Acid.
2. Water is inversely proportional to Yield.
3. Hence, Yield is directly proportional to Free Acid.
4. Yield is directly proportional to Active Matter.

After elaborate experiments and typical curve fits, it was found that:

$$Y \times AM = A \text{ constant} \quad \dots (1)$$

$$Y \times FA = (Y - a \text{ constant}) \times 100 \quad \dots (2)$$

The constant in equation (1) is a measure of the conversion of LAB into LAS.

The constant in equation (2) is actually the non-washable part of acid slurry.

### The Approach

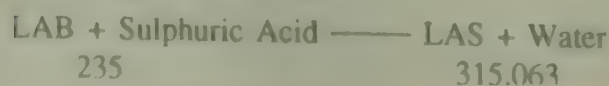
It is clear that the Active Matter, Free Acid, Free Oil and Moisture in total by "MASS" constitute to the Yield.

$$\begin{aligned}\text{Yield} &= \text{LAS} + \text{Free LAB} + \text{Free Sulphuric Acid} \\ &\quad + \text{Moisture} \quad \dots (A1)\end{aligned}$$

In these components Free LAB and LAS are closely related in the sense that, Free LAB gives a measure of percentage sulphonation of LAB which once again gives a measure of LAS.

Free Sulphuric Acid is a measure of the amount of dilution water used. For all applications, with reasonable accuracy, moisture may be taken as a constant.

Now, consider the reaction:



$$\begin{aligned}\text{Therefore, the amount of LAS formed / kg LAB for 100\%} \\ \text{sulphonation} &= 315.063 / 235 \\ &= 1.3407 \text{ kgs.} \quad \dots (A2)\end{aligned}$$

But, normally, only 98% sulphonation is attained.

$$\begin{aligned}\text{Now, the amount of LAS / Kg of LAB} \\ &= \frac{1.3407 \times 98}{100} \\ &= 1.3139 \text{ kgs} \quad \dots (A3)\end{aligned}$$

$$\text{Free LAB} = 0.02 \text{ kgs.} \quad \dots (A4)$$

$$\begin{aligned}\text{Now, assuming no FA and no moisture Y} \\ &= 1.3139 + 0.02 \\ &= 1.3339\end{aligned}$$

But, always some free sulphuric acid and some moisture is there, a normal moisture content of 0.0573 kgs may be safely assumed as constant.

$$\begin{aligned}Y - \text{Free Sulphuric Acid} &= 1.3139 + 0.02 + 0.0573 \\ &= 1.3912 \quad \dots (A5)\end{aligned}$$

The right hand side of the above equation (A5) is the amount of non washables in yield and whatever be the amount of water used, this part is a constant.

### Approach Table 1

#### SOME TYPICAL EXPERIMENTAL RESULTS FROM TPL PILOT PLANT LABORATORY, TRICHY USING OLEUM (20% free sulphur trioxide)

S.No.	% W	Y	% AM	% FA	% FO
1.	0	2.2	60	38	1
2.	5	1.6	82.5	12.5	1.2
3.	10	1.5	88.5	7	1.5
4.	12.5	1.48	90	6	1.5

### Yield - Active Matter Relationships

Based on the above workings, we will now try to work out a relationship between Y and AM. Assuming 98% sulphonability and 1 kg LAB input, LAS formed is 1.3139.

$$\begin{aligned}\text{Active Matter} &= (1.3139/\text{Yield}) \times 100 \text{ or} \\ \text{Active Matter} \times \text{Yield} &= 131.39 \quad \dots (A6)\end{aligned}$$

### Yield - Free Acid

$$\begin{aligned}\text{Free Sulphuric Acid} &= (\text{Yield} - 1.3912) \\ \text{from (A5), therefore} \\ \text{Free acid} &= [(\text{Yield} - 1.3912)/Y] \times 100 \dots (A7)\end{aligned}$$

### Yield - Free Oil

At 98% sulphonation, Free LAB is 0.02 kgs for 1 kg LAB sulphonation.

$$\begin{aligned}\text{Therefore, Free Oil} &= (0.02 / Y) \times 100 \\ &= 2 / Y\end{aligned}$$

### Yield - % Dilution Water

$$\begin{aligned}\text{When } W &= 0 \\ Y &= 2.2 \dots \text{from Approach table (1)} \\ \text{When } W &= \text{infinite} \\ FA &= 0 \\ \text{from (A7)} \\ \text{When } FA &= 0 \\ Y &= 1.3912\end{aligned}$$

$$\begin{aligned}\text{Therefore,} \\ \text{when } W &= \text{infinite} \\ Y &= 1.3912\end{aligned}$$

From the above, it is clear that the Yield - % Dilution Water relationship should have those limiting values. Now, we have three conditions:

1. W inverse proportion Y
2. At W = infinite, Y = 1.3912
3. At W = 0, Y = 2.2.

Many equation types were tried and a best fit type was chosen. The type was,

$$W = K (2.2 - Y) / (Y - 1.3912) \quad \dots\dots (A8)$$

When K is a constant, this type met all conditions.

From Approach table (1), the values of W for corresponding values of Y were taken in (A8) and finally the value of K found out was,

$$K = 1.5545$$

Therefore, the Yield - Dilution water relationship is

$$W = 1.5545 (2.2 - Y) / (Y - 1.3912) \quad \dots\dots (A9)$$

### Summary

1. Yield x % Active Matter = 131.39
2. % Free Acid =  $[(Y - 1.3912) / Y] \times 100$
3. Yield x % Free Oil = 2
4. % Dilution Water =  $1.5545 (2.2 - Y) / (Y - 1.3912)$

### THE NEWER APPROACH

In 'The Approach' we have dealt primarily with the inter-relationships between Yield, Active Matter, Free Acid, Free Oil and Dilution water.

In the approach relationships (1) through (4), we come across some constants like 131.39, 1.3912 etc., which does not have any physical value till now.

An attempt has been made to introduce better accuracy by introducing some new terms like Molecular Weight and Sulphonability.

Our working in approach were all based on 235 as molecular weight of LAB, and 98% sulphonability. But, practice shows that these are all variables and hence let us introduce the variables as:

M - Molecular weight as LAB

S - Sulphonability of LAB

Approach equation (A6) gives,

$$\begin{aligned}\text{Yield x Active Matter} &= 131.39 \\ 131.39 &= (315.063 / 235) \times 98 \quad \text{or} \\ &= [(235 + 80.063) / 235] \times 98\end{aligned}$$

where 98 is the sulphonability and 235 is the molecular weight of LAB respectively; introducing the newer variables M & S,

$$\begin{aligned}\text{Yield x Active Matter} &= [(M + 80.063) / M] \times S \text{ where} \\ &80.063 \text{ is the molecular wt} \\ &\text{of Sulphur trioxide.}\end{aligned}$$

Therefore,

$$\begin{aligned}\text{Yield x Active Matter} &= [(M + 80.063) / M] \times S \\ &= (M + 80.063) \times S / M\end{aligned}$$

In (A7) and (A8), we come across a constant 1.3912.

1.392 in (A7) and (A8) actually represents the non-washables in Yield (Ref. Approach).

### Definition

*Non-washables in Yield:*

It is the sum by mass of LAS, Free LAB, Moisture in Yield. It shows non-variance with dilution water (i.e.) whatever the amount of water used, this remains a constant. It is also the yield at infinite dilution water condition.

$$\begin{aligned}\text{from (A1),} \\ 1.3912 &= 1.3139 + 0.02 + 0.0573\end{aligned}$$

Using the newer variables and using a variable C2 instead of 1.3912

$$\begin{aligned}C2 &= [(M + 80.063) / 100] \times S / M + (100 - S) / 100 + 0.0573 \\ &= MS / 100M + 80.063 / 100M + 1 - S / 100 + 0.0573 \\ &= S / 100 + 80.063 S / 100M + 1 - S / 100 + 0.0573 \\ &= 1.0573 + 0.80063 S / M\end{aligned}$$

In all equations, the value of S/M is used, therefore, we introduce,

$$C1 = S / M$$

In (A8) we come across another constant 2.2

2.2 is actually the yield without separation or the amount of reaction mixture, when sulphuric acid 98% concentration

is used as the sulphonating agent, the yield without separation is 2.65 and K is 0.65.

### Summary

$$C1 = S / M \quad \dots\dots (NA 1)$$

$$C2 = 1.0573 + 0.80063 C1 \quad \dots\dots (NA 2)$$

$$\text{Yield} \times \% \text{ Active Matter} = (M + 80.063) C1 \dots\dots (NA 3)$$

$$\% \text{ Free oil} = (100 - S) / Y \quad \dots\dots (NA 4)$$

$$\% \text{ Free Acid} = (1 - C2/Y) \times 100 \quad \dots\dots (NA 5)$$

For oleum (20% free sulphur trioxide)

$$\text{Dilution water} = 1.5545 [(2.2-Y)/(Y-C2)] \dots\dots (NA 6)$$

For 98% sulphuric acid,

$$\text{Dilution water} = 0.95[(2.65-Y)/(Y-C2)] \dots\dots (NA 7)$$

For oleum (20% free sulphur trioxide)

$$\text{Yield} = (C2W + 3.4199) / (W + 1.5545) \dots\dots (NA 8)$$

For 98% sulphuric acid,

$$\text{Yield} = (C2W + 2.5175) / (W + 0.95) \dots\dots (NA 9)$$

Using above equations by knowing Yield, Molecular weight and sulphonability of LAB, Active Matter, Free Oil and Free Acid are calculated. The same values are compared with the actual experiments conducted. The results are both calculated and experimental values are tabulated. The error for AM is 0.06%, for Free Oil 7.0% and for Free Acid, it is 0.7%.

YIELD-PERCENTAGE WATER RELATIONSHIP

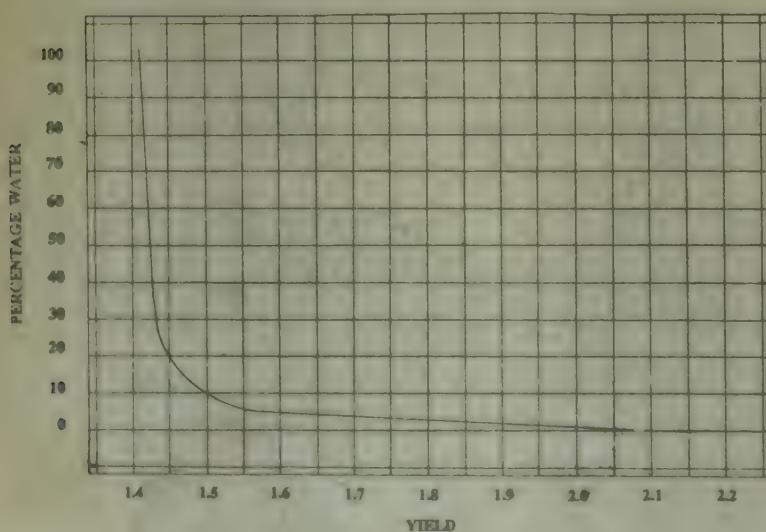


Fig. 1

### YIELD

S.No.	Observed value	Experimental value	% Error
1.	1.465	1.4309	+ 2.738
2.	1.470	1.5110	- 2.714
3.	1.475	1.445	+ 2.038
4.	1.480	1.542	- 4.038
5.	1.485	1.4365	+ 3.378
6.	1.487	1.4384	+ 3.375
7.	1.490	1.5102	- 1.340
8.	1.493	1.523	- 2.005
9.	1.495	1.535	- 2.668

Average percentage error = - 0.1375

### ACTIVE MATTER

S.No.	Observed value	Experimental value	% Error
1.	90.08%	90.61%	- 0.585
2.	89.73%	89.60%	+ 0.145
3.	89.42%	89.51%	- 0.1005
4.	89.12%	89.05%	+ 0.1348
5.	88.82%	88.96%	- 0.1574
6.	88.70%	88.94%	- 0.2698
7.	88.52%	88.41%	+ 0.1244
8.	88.34%	88.52%	+ 0.1020
9.	88.23%	88.16%	+ 0.08

Average percentage error = - 0.0585

### FREE ACID

S.No.	Calculated value	Experimental value	% Error
1.	5.03%	5.16%	- 2.5
2.	5.36%	5.43%	- 1.2
3.	5.68%	5.74%	- 1.04
4.	6.00%	5.94%	+ 1.01
5.	6.31%	6.24%	+ 1.122
6.	6.44%	6.40%	+ 0.625
7.	6.63%	6.82%	- 2.786
8.	6.81%	6.85%	- 0.584
9.	6.94%	7.01%	- 0.998

Average percentage error = - 0.7057

### FREE OIL

S.No.	Calculated value	Experimental value	% Error
1.	1.02%	1.1 %	- 7.2
2.	1.02%	1.12%	- 8.9
3.	1.02%	1.05%	- 2.85
4.	1.01%	1.14%	- 11.4
5.	1.01%	1.10%	- 8.18%
6.	1.01%	1.09%	- 7.30
7.	1.01%	1.00%	- 1.0
8.	1.01%	1.09%	- 7.3
9.	1.00%	1.10%	- 9.00

Average percentage error = - 6.8022

YIELD - % AM, % FA, % FO RELATIONSHIPS

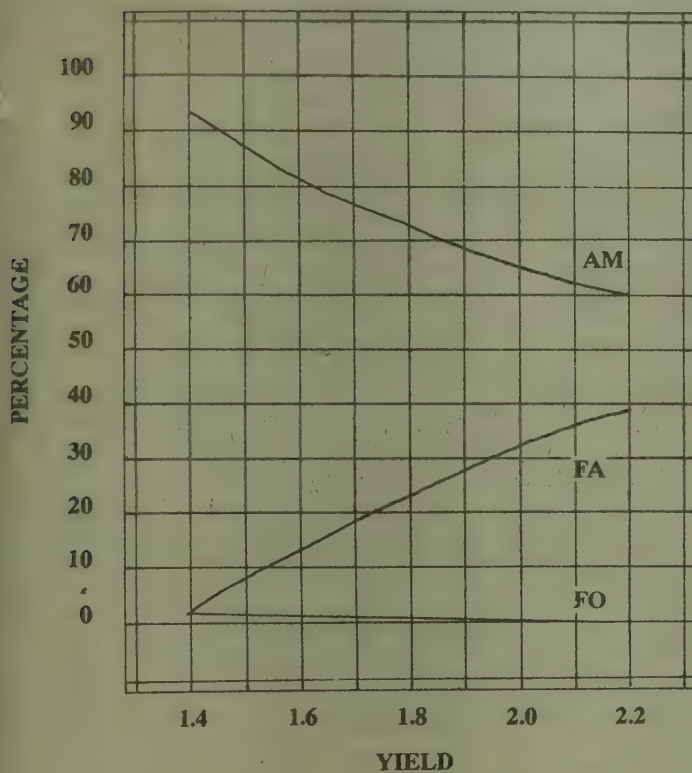


Fig. 2

YIELD - % AM, % FA, % FO RELATIONSHIPS

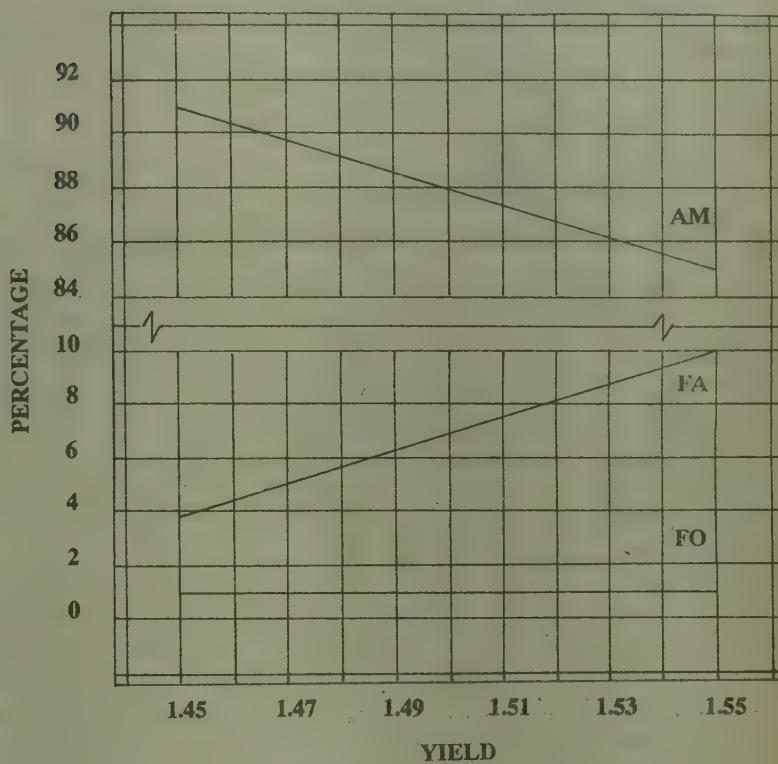
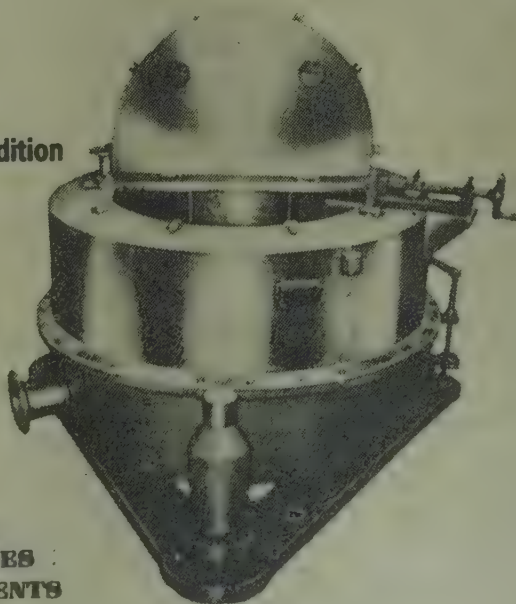


Fig. 3

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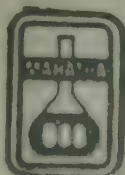
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# Application of Sodium Chlorate for the Pulp and Paper Industry

RAJIV PAREKH\*

In the highly competitive pulp and paper industry today, one prime objective is to produce high quality pulp at minimum cost. Sodium chlorate for bleaching can make a significant contribution for improving the quality of pulp and paper.

Sodium chlorate is used to produce chlorine dioxide which is a very powerful oxidizing agent uniquely suitable for pulp bleaching. It has the ability to produce high brightness pulp with little or no damage to the cellulose fibre. However, chlorine dioxide is also an unstable compound which must be highly diluted with air or water to prevent decomposition. Due to this reason, it is manufactured on site from sodium chlorate for large volume usage.

The chlorine dioxide can be manufactured by following processes:

## 1. Sulphur dioxide Reduction Process

This process requires sulphur dioxide to react with sodium chlorate in a dilute sulphuric acid solution.

**Operation:** Sodium chlorate and sulphuric acid are metered separately into the primary vessel of a two reactor system. The proper acid concentration is necessary for high efficiency and rapid rate of reactor. Sulphur dioxide, in air passes through diffusers on the bottom of generator. The amount of sulphur dioxide controls chlorine dioxide generation.

The air dilutes the chlorine dioxide and carries it to the absorption tower. Here the cold water absorbs the gas to form a solution. Sometimes the gases leaving the generator pass through a scrubber where sulphuric acid is removed.

The generated liquor overflows into the secondary reactor. Here most of the remaining chlorate reacts with sulphur dioxide in order to increase the overall yield of chlorine dioxide.

## 2. Methanol Reduction Process

The process requires methanol as the reducing agent to convert sodium chlorate into chlorine dioxide, sulphuric acid is also added to the solution.

**Operation:** Sodium chlorate and sulphuric acid are separately metered into number one reactor of a two reactor

system. Generally the sulphuric acid is diluted and cooled prior to addition to reduce the heat. Methanol is metered into the reactor as a liquid to control the rate of chlorine dioxide production. It is necessary to use the correct amount in order to avoid chlorine generation.

Air passes through a plastic distributor plate at the bottom reactor. Air and chlorine dioxide flow to the absorption tower where a dilute solution is made after contact with cold water.

The generated liquor overflows to the number two reactor where more sulphuric acid, higher liquor temperature and additional methanol complete the conversion of chlorate to chlorine dioxide.

## Bleaching with Chlorine Dioxide

Chlorine dioxide has rapidly gained favour as a versatile bleaching agent for pulp. Because of its selective oxidising ability, chlorine dioxide either by itself or with chlorine is capable of producing high brightness, high strength pulp.

## First Stage Sequential and Mixtures

Sequential bleaching involves the rapid reaction of unbleached brown stock with chlorine dioxide followed by chlorine both at low temperatures. Pulp washing follows before the pulp is treated at the extraction stage with caustic. Kraft pulp may also be reacted with chlorine and chlorine dioxide as a mixture in the chlorination stage. The usual chlorination operating conditions should be observed.

A reduced bleaching cost is generally achieved through lower over all chemical usage to reach target brightness. The pulp will show increased viscosity and less brightness reversion.

Chlorine dioxide increases the efficiency of pulp delignification in the chlorination stage and high substitution for chlorine offers marked advantages over low levels of substitution.

## Oxidation Stages

It is common practice to bleach Kraft pulp with two chlorine dioxide stages. The effect on brightness development is shown with respect to the following.

**Time:** About 95% of the total brightness change is realised in the first half hour. About three hours are necessary

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as tower retention time to achieve optimum results.

**Temperature:** Increased temperature will produce a higher brightness pulp but a positive residual of chlorine dioxide must remain to the end of the stage. If not, brightness reversion will take place.

**pH:** The pH of the solution dramatically affects the final brightness of the pulp. A high pH will not only lower pulp brightness but also degrade the fibres. A final pH around 4 is desirable on the first chlorine dioxide stage. Below pH 3, common high quality stainless steels are prone to accelerated corrosion. The second chlorine dioxide stage may vary from 5 to 7 without significant brightness change.

**Safety:** Sodium chlorate as a result of being a very powerful oxidising agent is a dangerous chemical and great care should be exercised in handling it. Sodium chlorate should

not come in contact with any organic substance or sulphur, sulphates, ammonium compounds, phosphorous, cyanides, acids, metallic oxides and reducing agents of any sort.

Chlorine dioxide is similarly a very powerful oxidising agent. The decomposition of chlorine dioxide breaks down into chlorine and oxygen, generating heat and producing a greater gas volume thus causing a 'puff'. If concentration is more than 15%  $\text{ClO}_2$  in air, then the puff may be quite violent. The causes of puff are due to the presence of any catalytic or reducing material entering a feed stream, like iron scale from piping etc. In such cases the chlorine dioxide will continue to decompose until the contaminant is exhausted.

Apart from pulp bleaching, sodium chlorate is used with solid rocket propellants (through ammonium perchlorate), herbicides, defoilants (for soyabean crop), bleaching of oils, in the manufacture of perchlorates, uranium production etc.

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T.B.H.Q.  
BUTYL CELLOSOLVE ACETATE  
SORBIC ACID  
POT. SORBATE  
DL MALIC ACID  
CALCIUM PROPIONATE  
CRESYLIC ACID  
CELLOSOLVE ACETATE  
CETYL/CETO STEARYL ALCOHOL  
COCONUT DI ETHANOLAMIDE  
(IMPORTED)  
CALCIUM CHLORIDE  
CARBON DISULPHIDE  
CAPROLACTUM  
1,4 DIOXANE  
CARBITOL/BUTYL CARBITOL  
CARBITOL ACETATE  
BUTYL CARBITOL ACETATE

CYCLOHEXANE  
CYCLOHEXYLAMINE  
D.B.T.O./D.O.T.O.  
DI METHYL ACETAMIDE  
DMDCS  
ISO PROPYL ETHER  
MONO DI TRI ETHANOLAMINE  
MONO DI TRI ETHYL AMINE  
ISO PROPYL AMINE 99%  
ISO PROPYL MYRISTATE  
(IMPORTED)  
E.P. 40/60 (IMPORTED)  
ISO OCTANE 99%  
N. HEPTANE 99%  
H. HEXANE 99%  
N. PENTANE 99%  
ETHYLENE CHLOROHYDRIN  
ETHYLENE DIAMINE  
AMYL ALCOHOL  
LITHIUM HYDROXIDE  
LITHIUM CARBONATE  
OLEYL ALCOHOL

NITRO METHANE  
MOLY. DISULPHIDE  
POT. CARBONATE  
SOD. HYPOCHLORITE  
SOLN. (8 TO 10%)  
SOLVENT NAPHTHA  
(LIGHT/HEAVY)  
SOYA LECITHIN  
(INDIAN/BRAZIL)  
T.H.F.  
T.E.G. (INDIAN/IMPORTED)  
THIOGLYCOLLIC ACID 80%/99%  
CALCIUM HYDROXIDE  
(EXTRA PURE)  
TERT. BUTANOL  
DISTILLED MEG  
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**WITH MODVAT**

# Chemical News from Abroad

## ICI REPORTS SHARP FALL IN FIRST-HALF PROFITS

ICI reported an unexpectedly sharp fall in first-half (H1) profits. Net income was hit by extraordinary charges of £100m (\$182m) to cover losses on the disposal of the UK fertiliser business and fell 34% to £372m on revenues up 3% to £6.8bn. Trading profits fell 20% to £734m and pre-tax profits by 21% to £33m. Finance director Alan Clements said the fall in pre-tax profits was accentuated by 'significantly' lower exceptional gains from disposals than last year.

At a press conference, the beleaguered-looking Denys Henderson described the results as 'disappointing'. In Q2, volume growth of basic products slowed, prices declined and costs rose. The major problem in Q2 was the month of June. Henderson said the results for April and May, while down on last year, were 'moderate', but those for June (usually a good month) — were 'poor'. This does not augur well for the Q3 results. As the other H1 results indicate, ICI is not the only chemical company suffering from the more difficult

economic conditions. Henderson noted that in H1 the rate of growth in chemical production was lower than for industrial production generally.

In 1990, economic growth in both the UK and US was lower than ICI had envisaged, but growth in the other OECD countries was slightly better than expected, particularly in Germany.

The 3% advance in turnover was made up of a 4% gain from favourable currency movements and a 1% advance in selling prices, both offset by a 2% loss resulting from divestments. The currency impact on pre-tax profits was estimated by Clements to be £70m.

Looking at the sector breakdown, industrial products — the basic businesses of the company — reported the worst downturn. Trading profits were affected by a combination of poor demand, a more 'normal' and therefore less advantageous, supply/demand balance, additional capacity and hence poor pricing. ICI suggested the results of industrial products were returning to the more normal levels after two exceptionally good years. This is disappointing as it ignores the effects of inflation and the

investment and cost-reduction measures the company has made in the intervening period. ICI is virtually admitting the group remains tied to the fortunes of the chemical cycle.

Several of the more specialist, and therefore supposedly more resilient, consumer and speciality product businesses, also registered problems. Films suffered from economic problems in Brazil and by poor pricing for oriented PP film. Polyurethanes suffered from weak demand in the US and Europe, although the market situation has improved recently. Growth in agrochemical results were held back by adverse weather.

Pharmaceutical profits advanced 29% as a result of an exceptional gain in Q1 and good growth in sales of the recently launched products, the Ace inhibitor Zestril, the anticancer drug Zoladex and the injectable anaesthetic Diprivan. ICI's paints business did well to increase profits, despite the difficult market conditions in the UK and US.

Trading profits reported by fertilisers fell 87% to £2m. The UK and Canadian businesses recorded losses in H1, while remaining activities in India, Australia and Malaysia operated profitably.

To remain competitive, Henderson said it was 'essential' the company improved its productivity. Despite the obvious short-term difficulties, ICI remains confident that it is pursuing the correct strategy. The only forecast Henderson would make was to say 'the next few months would be difficult'.

## TIGHTER MARGINS CUT DU PONT INCOME

Du Pont reported modestly lower net income for the second quarter, reflecting the weak US chemical sector and consequent pressure on margins. However, in comparison with other US chemical companies, results are temp-

ICI six-month sales and trading profits (£m)

Sector	1990		1989	
	Sales	Profits	Sales	Profits
Pharmaceuticals	703	248	648	192
Paints	868	51	796	49
Other effect products	1237	57	1143	73
General Chemicals	1021	80	1031	170
Petrochemicals/ plastics	1453	88	1547	234
Fibres	388	28	341	24
Industrial Explosives	234	19	192	24
Agrochemicals and seeds	879	149	810	146
Fertilisers	433	2	468	15
Group Total*	6823	734	6642	914

\*excluding inter-segment eliminations and others

Source: ICI

ered by the lower exposure of the group to the commodity chemical sector. Q2 net income declined 2.8% to \$694m, on sales up by 4% to \$646bn, against the same period last year.

Of the individual business segment, only Du Pont petroleum business, Conoco, reported an increase in net income, except coal, which was adversely affected by industrial action in 1989.

The industrial products segments reported net income of \$135m on sales of \$929m, a decline of 14.6% and 1.4%, respectively. Du Pont said this reflects lower sales of CFCs and increased expenditure on CFC alternatives.

Earnings in the fibres segment decreased 8.8% due to lower demand in apparel fibres, carpet fibres and nylon industrial yarn in several of the major markets. Net income for the division, including charges relating to the phase-out of Orlon acrylics business, was \$157m.

Polymers declined 6.3% to \$133m, due to restructuring cost, partly offset by improved earnings in Europe and strength in the automotive refinish market, Du Pont said.

#### DOW EARNINGS FALL

Dow Chemical reported higher sales with lower than expected earnings for the second quarter as a result of weakening markets and higher manufacturing costs in its chemical and plastics businesses. Operating income was down 39.6% to \$714m, on sales up 4.5% to \$4.8bn, compared to the same period last year. Net income fell 50% to \$364m.

Consumer specialties was the best-performing business segment, where operating income advanced 46% to \$268m on sales up 48% to \$1.3bn. A strong performance in pharmaceuticals and agrochemicals was recorded, with

consolidated figures for the merger with Marion Laboratories and the agro chemical joint venture with Elanco included for the first time.

Chemicals and performance products posted sales of \$1.2bn and operating income of \$177m, down 12% and 63%, respectively, said to reflect lower prices, higher costs and lower plant operating levels. Sales of plastics were \$1.8bn, down 3%, with operating income down 40% to \$279m.

#### ICI RELINQUISHES UK FERTILISERS TO KEMIRA

ICI has made the first move towards rationalising its commodity chemicals business in Europe with the sale of the UK fertiliser business to Kemira. John Baker looks at the background to the move and its implications.

To watchers of either ICI or the European fertiliser market, the company's move to exit the UK fertiliser business — which it describes as 'a major step to reorganise its business portfolio in Europe' — came as little surprise. No real surprise either, that Finland's Kemira picked up a good deal of the business.

Like the other northern European player, Norsk Hydro, Kemira has been expanding its fertiliser business steadily over the last five years. The two companies now rank number one and two in the European market. Together, the three companies hold roughly 65-70% of the UK fertiliser market, with ICI the current market leader.

The remaining 30-35% is accounted for by imports from eastern and southern Europe, which have been rising steadily over the last 10 years.

The market is worth some £600m/year (\$1.1bn), but been plagued in recent years by falling demand, over-capacity, low prices — lower even than on the European mainland where some price improvements have been possible recently — and the prospects of a continuing decline in size.

ICI is predicting a decline in the UK fertiliser market of between 10-20% over the next five years, owing in large part to European commission measures to reduce crop surpluses and limit nitrogen applications for environmental reasons. Kemira believes the decline will be at the lower end of this range.

Giving its reasons for withdrawing, ICI said it had concluded that 'its UK fertiliser business is no longer viable and that it lacked critical mass in Europe, where it has only a 5% market share. It added: 'Despite actions in recent years to reduce costs and improve efficiency, ICI considers that further rationalisation of both production capacity and the number of manufacturers is essential for the European and UK industry to return to even a modest state of health'. Both Kemira and ICI made losses on their business in the UK last year. ICI has made provisions of £100m in its first-half accounts for closing the business. Lack of profitability, said ICI, has meant that the massive investment needed to sustain competitiveness in the market has not been possible.

#### Impact of East European fertilisers exports to EC

Exporting country	1985	Market share %	1988	Market share %
	volume tonne		volume tonne	
Hungary	90,877	0.60	76,957	0.58
Poland	11,791	0.08	34,065	0.25
Romania	61,655	0.42	20,408	0.15
Yugoslavia	129,324	0.88	261,395	1.91

Despite ICI's recent protestations that its fertiliser operations were too closely integrated with the rest of its bulk chemical operations to allow disposal, it has found a workable solution for the withdrawal. ICI will close its production plants at Billingham, Cleveland, and the associated headquarters facility there. This involves the scrapping of a 500,000 tonne/year ammonium nitrate plant, 350,000 tonne/year of granular compounding capacity, and a 300,000 tonne/year ammonia plant. In addition, three nitric acid units will be closed. ICI will, however, retain its newly expanded 500,000 tonne/year ammonia unit at Billingham and two nitric acid units. These will ensure feedstock supply for ICI's polyamide and amines businesses, among others.

The closures will mean the loss of 640 jobs and are expected to be completed by the first quarter of 1991. They follow previous cutbacks in the business in the past two years: closure of its Immingham site and rationalisation of compound production and intermediates production. In the last two and a half years, before the Billingham closure, ICI has scrapped 1.3m tonne/year of finished fertiliser capacity and 1.1m tonne/year of intermediates capacity, with the loss of 1100 jobs. Kemira is acquiring ICI's facilities at Severnside, near Bristol, which includes two ammonia plants, facilities for ammonium nitrate (AN) and NK production, and a mothballed NPK unit, which says Kemira could be reopened for a small investment. The ammonia plants use ICI's LCA technology, the rights to which are being retained by ICI. Kemira is also getting ICI's smaller facilities at Leith, near Edinburgh, which comprise a nitric acid unit and an NPK compounding unit. Also included is ICI's Chafer liquid fertiliser business, which has eight units in the UK and is currently operated by ICI's subsidiary Britag Industries.

Some 540 of ICI's employees will transfer to Kemira, including around 50

specialist staff from the closed Billingham HQ. ICI is currently in discussion with potential buyers for the Britag business, as well as several other smaller parts of its fertiliser operation, including Scottish Agricultural Industries and the Liquid Carbon Dioxide and Drikold operations. ICI is keeping its Howden site which makes garden fertiliser products. The ICI assets acquired will add some 1m tonne/year to Kemira's UK capacity, giving it the market leadership. The company has two ammonia plants in the UK, one at Ince, near Chester, and one at Hull. In addition, it has nitric acid, AN and granular compounding at Ince. Other facilities are located at Saxilby, Lincoln (bulk blended fertilisers), and Sharpness (NPK and PK blended compounds). Kemira also has a facility in Hillsborough, Northern Ireland, for bulk blended NPK fertilisers.

According to John Davies, managing director of Kemira Ince, the acquisition reinforces Kemira's commitment to both the UK and European fertiliser markets. The company is already Europe's number two, with a fertiliser capacity of some 8.5m tonne/year. Around one-third of group sales of £1.7bn in 1989 came from fertilisers. Commenting on the rationale behind Kemira's decision to buy the ICI business, Davies said that he anticipated there would be significant operating synergies, adding, "I believe the business in the UK can be profitable". The acquisition will enable Kemira to roughly double its UK sales of fertilisers without increasing its sales and administration overheads proportionately. The company anticipates some rationalisation of distribution arrangements and lower distribution costs now that it has three main production sites, rather than one. Davies admits, however, that he expects to lose some of the sales Kemira will acquire from ICI.

Expanding on the operating synergies, Davies explained that ammonia for the Leith site would be available from Hull, while the Ince site, which is cur-

rently short of ammonia, could now source from Severnside. As a result of the acquisition, Kemira's UK operation will be in a position to send ammonia to other company sites in Europe. The removal of the Billingham capacity accounting for 15-20% of UK production, will allow Kemira to run its plants at full capacity, thus gaining operation cost advantages. In European terms, however, the rationalisation will have only small effect. There still remains a structural problem in the European fertiliser industry and further rationalisation must surely be on its way.

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#### NO EC ACTION ON NPK IMPORTS

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Despite the problems facing the European fertiliser industry, the European Commission has halted antidumping proceedings against NPK fertiliser imports from Eastern Europe. The move follows the decision by CMC Engrais, the federation of European fertiliser manufacturing associations, to withdraw a complaint lodged with the Commission last year. CMC Engrais lodged its complaint with the Commission in 1989, alleging evidence of dumping and of material injury associated with imports from Hungary, Poland, Romania and Yugoslavia. Accordingly, the Commission started antidumping proceedings and investigations. Evidence available to the Commission showed that during the investigation period prices of the alleged dumped imports were, on a weighted average lower by about 20% than those charged by EC producers. During the same period, EC NPK production fell 8.9% from 8226 295 tonne in 1985 to 7534 456 tonne in 1988. Capacity utilisation rates rose from 82.9-85.9% as EC production capacities declined from 9921,000 to 8242,000 tonne. While EC producers saw sales rise 7.5% from 5446,258 tonne in '85 to 5858,928 tonne in '88, both prices and profitability declined in the same period. Prices dropped between '85 and '87 to recover slightly in 1988.

## Biotechnology

### GLAXO SEALS FIRST R & D COLLABORATION WITH GILEAD

Glaxo has formed a research collaboration with a US genetics company, Gilead Sciences of Foster City, California to develop new anticancer drugs by exploiting new developments in the field of molecular genetics. The \$20m deal will offer the UK-based company the chance to become pre-eminent in the emerging field of genetic targeting.

The deal is the first of its type for Glaxo, which, in contrast with most other research-based pharmaceutical companies, did not form research collaborations in the comparable biotechnology arena. Glaxo will support research for an initial five-year period and take a minority stake in the company. The agreement allows Glaxo exclusive worldwide rights on anti-cancer agents, but does not preclude either party utilising developments in other therapeutic areas.

The research work will centre on finding therapies for slow-proliferating, solid tumour cancers, such as colorectal, lung, breast and prostate diseases. Often, these cancers do not respond to the antiproliferative cytotoxic agents currently available, such as Cisplatin,

which attacks rapidly dividing cells. Current treatment usually includes surgical intervention, but problems can occur when metastasis, spreading of the tumour, occurs.

Genetic targeting is the use of therapeutic agents to selectively inhibit disease-causing genes, by way of their base sequence. The idea is to synthesise small DNA-like molecules (chains of amino acids) called oligonucleotides or 'oligos', which can enter the DNA of cancerous cells and prevent them reproducing. Gilead's president and ceo, Dr. Michael Riordan, says that for an oligo to be specific to a particular mutated gene, it needs to be 12 bases long. To cover every gene in the body, 15 bases are required.

According to Dr. Richard Sykes, Glaxo's research and development director, the main tenet of genetic targeting is the ability to discriminate between nontumour and tumour tissue. This, and the hypothesis that oligos can prevent cell proliferation is tested 'beyond doubt, he believes. Sykes believes genetic targeting to be a very exciting area of modern science with immense potential. It offers a technique which could be used as a preventative in individuals predisposed to developing cancers, rather than just treating the disease, he adds.

Synthetic oligonucleotide analogues can bind to either the messenger RNA (mRNA) or the DNA of the cancer-causing gene, with both ways preventing the DNA expressing the protein which it normally encodes. Thus, it can be seen that genetic targeting differs from other areas of medicine such as gene therapy (which offers the potential to insert replacement genes) and the diagnosis of defective genes.

Only one of the two strands that comprise DNA, is copied to form the RNA that, in turn, marshals amino acids into the right sequence to make a specific protein. This is called the 'sense' strand. Small parts of the other, 'anti-sense' DNA strand can be made by scientists synthetically and can be used to render RNA impotent by binding to it specifically and preventing protein synthesis. Another route to therapeutic agents involves modified oligos that bind directly to double-helix shaped (double-stranded) DNA, rather than the single-stranded) RNA.

Genetic targeting has only emerged as a viable concept through recent advances in molecular genetics. Specific genes implicated in viral diseases and certain forms of cancer have been identified and their base sequences determined. In addition, the first potential gene-targeting therapeutic agents, synthetic oligos, have only recently come within reach of organic chemistry.

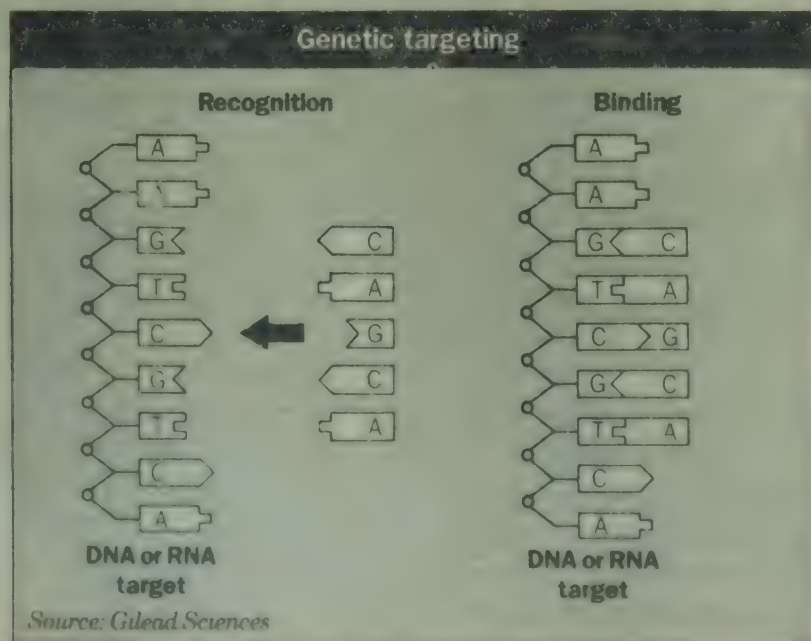
Since oligonucleotides are much smaller, typically 12 bases long, they are closer to conventional pharmaceuticals than proteins.

Despite this, there are large differences between a chemical that inhibits a gene's action *in vitro* and a medicine, Glaxo point out.

Among the considerable hurdles yet to be overcome are:

#### Binding

The oligo must exhibit a high degree of selectivity, that is, it must recognise



and bind to the correct gene sequence and no other.

### Solubility

The new drugs have to be sufficiently soluble in water to be transported around the body and in lipids to be able to enter cells.

### Stability

The oligos must be able to resist digestion by enzymes, if they are to reach the gene target intact.

Sykes suggests the researchers may have to look at extracellular targeting agents, such as monoclonal antibodies, to efficiently deliver the oligos to the tumour site. Another problem to be overcome is how to increase the permeability of the cytoplasm of the cell, so that sufficient oligos reach the nucleus. Mutated genes that cause cancer, or oncogenes, have already been identified in a number of solid tumours. Two years ago, Glaxo assembled a unit producing transgenic mice, which develop particular cancers. These so-called 'oncomice', can be used as models for the preclinical trials and, to date, Glaxo has developed lines expressing colo-rectal, breast and prostatic cancers.

Since Gilead's formation in 1987, it has been actively building up intellectual property in genetic targeting techniques. According to Gilead's chief financial officer, Michael Bigham, funding has been by venture capital investment of \$12m. 'Our success in attracting investors has brought other entrants into the field', claims Bigham, 'but we have a head start on them'. If, as Gilead's Riordan believes, genetic targeting will open up a third generation of pharmaceuticals, following biotechnology and the traditional empirical screening techniques, Glaxo, again, looks set to reap the rewards.

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## DU PONT-MERCK VENTURE REFLECTS MERGER PRESSURE

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Du Pont's decision to rationalise its

pharmaceutical operation into a 50:50 joint venture with Merck, to be called Du Pont-Merck Pharmaceuticals, was prompted by the realisation that its existing pharmaceuticals business did not have the 'critical mass' to commercialise its R&D portfolio alone.

The new partnership, which will create a separate company, is planned for January 1991, pending negotiations of definitive agreements and regulatory approvals. It will comprise Du Pont's entire pharmaceutical and radiopharmaceutical imaging agent business, with Merck providing development funds, marketing rights to several drugs, industry experience and cash. Du Pont's other healthcare divisions, diagnostics, biotechnology and X-ray products are not included in the new company.

The deal will therefore allow Du Pont access to enhanced marketing and development capability and in return, Merck can exploit Du Pont's pharmaceutical research.

Du Pont's objective has been to develop a global integrated research-based pharmaceutical company, says Ken Kasses, director of business development in Du Pont's medical products division. However, the business could not develop organically at a sufficient rate to remain competitive. Kasses told ECN that a partnership was the best way to expand the business in Europe and advance products in the development stage.

Du Pont's decision reflects the links already forged with Merck — the two companies entered a research/marketing agreement in last October — and Merck's pre-eminent position in the pharmaceutical industry, says Kasses. It is understood that Merck, however, chose not to buy Du Pont's business outright, because of the high cost of acquisitions.

Drugs currently marketed by Du Pont and transferred to the partnership

include: Coumadin, an anticlotting agent; Hespan, a plasma volume extender, the analgesics Percodan and Percocet; a thallium imaging agent; and the recently approved anti-arrhythmic Ethmozine. Merck will provide the venture with certain marketing rights to the anti-Parkinsonian agent Sinemet and the combination diuretic Moduretic, for treating hypertension, in West Germany, France, Italy, Spain and the UK. Du Pont gained marketing rights to the latter two drugs in the US, under the earlier agreement in return for rights to Du Pont's angiotensin II (AII) receptor antagonists.

In addition, the venture will market Proscar, a compound under phase III development by Merck for treating enlarged prostate gland, in those same European countries, once it gains the regulatory approvals, expected by 1993.

Currently, Du Pont funds development in four therapeutic categories: cardiovascular, anti-inflammatory, oncology and Alzheimer's disease. Much of the work is still at the early stages, and therefore requires progressively greater investment to bring to market. Indeed, both companies anticipate the new company will not reap returns until the late 1990s.

Du Pont's main research compounds are the AII receptor antagonists, a potential new class of hypertensives, DuP 996, a compound with potential to treat Alzheimer's disease and memory impairment and DUP 785, in phase II, an anti-cancer with immune suppression properties.

Du Pont-Merck Pharmaceuticals will have a research staff of 1,500, and R&D budget of \$230m and a professional sales staff of 600, in the first year of business. This ranks the company about 28th in worldwide terms of R&D expenditure and manpower. Sales estimates of \$700m would put the venture about 50th in terms of pharmaceut-

ical sales, a similar level to that of Fisons. Currently sales are \$550m, however, the business does not return a profit because of the comparative high level of high R&D expenditure. Even at projected (1991) levels, R&D expenditure would still be over twice the industry average (currently about 14% of sales). The securities firm Shearson Lehman Hutton believes the Du Pont-Merck partnership is symptomatic of consolidation in the pharmaceutical industry. Earlier this year, SLH predicted a further wave of drugs company mergers, as it calculated pharmaceutical companies could not maintain the current levels of R&D expenditure and provide an adequate return to their investors.

#### ANTI-CHOLESTEROL DRUG JV REBRON

British Bio-technology (BB) has set up a research collaboration with the Japanese company, Japan Tobacco (JT), to develop a novel synthetic type of cholesterol lowering agents, HMG CoA reductase inhibitors. The agreement replaces an earlier one, under which BB had been developing drugs with McNeil Pharmaceutical, a Johnson & Johnson subsidiary, for approximately three years. This was terminated four months ago, when McNeil reorientated its research priorities. Under the terms of the new research collaboration, BB

retains rights to market any drug stemming from the research outside Japan. The research is understood to be at the point of selecting a candidate compound for clinical trials. In contrast of existing drugs in this class, BB's lead compounds have been chemically synthesised as opposed to being byproducts of fermentation. BB believes this allows it the flexibility to 'build in' exactly those properties required of the drug consequently offering a route to a better therapy.

JT, a stock company fully owned by the Japanese Government, has been diversifying into pharmaceuticals, agribusiness and engineering. The company bought a stake in BB in May 1989.

#### UK SAYS NO TO MONSANTO'S BST

The UK Veterinary Products Committee 'does not believe Monsanto's bovine somatotropin (BST) product is ready for a commercial licence at this time', according to a statement issued by the company. The VPC, an independent advisory committee of the Ministry of Agriculture's Veterinary Medicines Directorate, reviewed an extensive dossier of data on several years' trials of the genetically engineered hormone. According to Monsanto it found that 'a few issues of concern remain'. Areas of concern are associ-

ated with the pharmaceutical process conditions of full, commercial-scale production, together with 'some specific aspects of animal safety', according to the company. Full details are expected to be released after the committee's next meeting, scheduled for September.

However, the VPC found that BST 'posed no risk to either human safety or the environment', Monsanto reports. 'It is also satisfied with the claims of product efficacy demonstrated by the trials'. When further details on the VPC's preliminary recommendation are available, Monsanto plans to make use of the Medicines Commission appeal procedure to provide adequate data and reassurance on process conditions to resolve the remaining concerns'.

Monsanto's director, animal sciences division, Europe and Africa, Robert Deakin acknowledged that the VPC has already challenged Monsanto extensively on the registration dossier, which is 'one of the most complex for any product ever submitted to the VPC'. Before it can be sold in EC member states, BST must be approved by the EC's Committee for Veterinary Medicinal Products (CVMP). A decision from this committee is currently awaited. Monsanto's BST product has already been licensed for use in seven countries—the USSR, Czechoslovakia, Bulgaria, South Africa, Namibia, Mexico and Brazil.

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## Environment

### NRA PROPOSES TIGHTER UK RIVER DISCHARGE CONTROLS

The UK National Rivers Authority (NRA) has published proposals aimed at achieving tighter control of effluent discharges to inland and coastal waters. In *Discharge Consent and Compliance Policy: a Blueprint for the Future*, the NRA makes 33 detailed recommendations to alter the current 'unsatisfactory' system by which 'consents' are granted for discharges. These consents set obligations on discharges and limit discharges into water; it is illegal to discharge toxic or polluting substances without one.

Currently, a company cannot be prosecuted unless 5% of discharges, taken over a year, break licence conditions. Under the proposal regulations, prosecution could take place if a single sample failed.

'Central to the success of the new arrangements would be greater involvement of discharges in pollution prevention', the NRA states. A key recommendation of the report is for absolute limits to be set on effluent flows and concentration for all environmentally sensitive discharges. It would be an offence to exceed these limits.

Under the NRA proposals, controls on sewage works and on other industries would be placed on an equal footing, bringing to an end the anomaly, which currently allows sewage treatment works to operate on only 95% compliance with their consents.

'If the NRA is to gain the confidence of the public as a licensing body for discharging waste, it must have the means to control the absolute concentrations and the total amounts of substances discharged', according to NRA chief scientist, Dr. Jan Pentreath. 'It also needs to be able to insist that monitoring is rapid — even automatic — and mean-

ingful; he said.

As part of its strategy of making discharges more actively involved in pollution prevention, the authority plans to ask corporate business to designate named managers at their sites who would be accountable for the 'good operation of discharges'. There would also be a legal requirement that the NRA be told of any changes in the circumstances of discharges not sampled regularly. Data would be required by the authority to prove that maintenance obligations were being met.

A further recommendation of the report is that there should be more widespread use by dischargers of 'continuous and automatic monitoring of environmentally significant discharges'. The equipment used for this would need to be checked by the NRA, which would 'where necessary, specify the provision of remote access equipment'. This would not, however, replace the need for independent NRA monitoring and sampling, which would be required by law to bring a successful prosecution.

A new method of enforcing the NRA's regulations would be the proposed 'action warnings', which would be issued to discharges when urgent action was needed to prevent legal limits from being exceeded.

### TOUGH TERMS FOR SANDOZ PLANT

Eire's National planning board's go-ahead for the Punt 170m (\$102m) Sandoz plant is subject to some of the most stringent conditions ever imposed on an industry in the country. The plant is to be built at Ringaskiddy, County Cork.

The tough conditions attached to the planning permission, running to 34 pages, reflect the concern voiced by the local community, which has been supported by Eire's junior environment

minister, Mary Harney. The planning board has imposed a zero limit on dioxin emissions; and insisted that the company prepares a waste reduction programme and gives a progress report on its achievements each year.

In all there are 69 conditions contained in the air pollution licence granted by the board. Extensive testing of the two incinerators at the proposed plant must be carried out before production can begin. And for the first time in Eire, under the terms of the planning permission, the public will have the right to enter the plant while it is in operation to check that the conditions set out by the board are being observed.

The board's decision, which followed a lengthy public inquiry into the project, surprised even local environmentalists with its toughness. But a spokesman for the Cork Environmental Alliance, the main group of objectors, refused to rule out an action in the Irish High Court to try to have the planning permission reversed. She said: "The issue is still being considered by our legal team".

### ECOVINYL NEARER

Wheaton Plastic Recycling Co. of New Jersey has modified its Millville recycling facility to enable it to grind and wash post-consumer polyvinyl chloride (PVC) bottles. Material is being supplied by Oxychem.

The company, a division of Wheaton Industries, has to date processed mainly post-consumer high-density polyethylene (hdPE), which floats on water. The modifications to the Millville plant will allow recovery of clean PVC, which sinks. In addition, the drying system capability has been debottlenecked to a process capability of some 6350 tonnes/year. The modification was needed for Wheaton Plastic Recycling to follow its speciality processor strategy, according to its general manager, George P. Glenn.

With the availability of recycled PVC, Oxychem (which is working with Wheaton on this project) moves a step closer to commercialising its new line of 'recycle-containing' PVC compounds, trade-named Ecovynyl. The first products from this line will be targeted at the bottle market; technical development of these products is 'well under-way'.

### UK INSTITUTE WILL ASSESS ENVIRONMENTAL REPORTS

Laporte, Unilever and BP have joined three other major UK concerns to establish an Institute of Environmental Assessment 'to set professional standards for environmental consultants and a firm independent reference point for environmental advice'.

Since 1988 and the adoption of EC directive 85/337, environmental assessment has been a legal requirement at the design stage of many projects. Recent

studies, say the IEA, have been shown that up to 50% of advice given in these environmental reports does not meet the needs of proper environmental protection.

The three companies, together with Anglian Water, Commercial Union and European Land, have provided £60,000 (\$108,000) to set up the Institute, based in Grantham, Lincolnshire. Dr. Tim Coles, an environmental scientist, has been made executive director and secretary.

The IEA will be a membership-funded, nonprofit-making organisation with three goals: to establish a register of competent consultants; to offer environmental advice; and promote best practice environmental techniques.

'The problem of variable quality advice lies with a lack of any professional accreditation system', notes Dr. Coles, 'and partly with incorrectly

defining the scope of assessment reports. The establishment of a professional institute will help resolve many of these problems'.

In its registration role, the UK institute hopes to operate on similar lines to the existing Dutch organisation, the Environmental Impact Assessment Commission, based in Utrecht. Environmental statements will be audited by a group of independent scientists to see if they meet quality standards. Membership of the institute will be open to corporate bodies only, including industry, consultancies, government agencies and regulatory bodies, and planning authorities.

### POTASH MINES FOR TOXIC WASTE

Plans are underway in France to turn the country's only operative potash field into an underground storage facility for toxic waste. The field, which is located some 15km northeast of Mulhouse, has only a short remaining life. The two mines there are worked by Mines de Potasses d'Alsace (MDPA).

MDPA, a subsidiary of state-owned Entreprise Minière et Chimique (EMC), has already planned conversion of the underground galleries, which lie at depths of 400 to 1,100m and cover some 20,000 hectares. Waste would be taken from the Rhine valley area. Excluded from the project are liquid and radioactive wastes as well as explosives.

Louverens Medemblik, head of one of the mines, said that local authorities and environmental associations had already been informed of the project and there had been little opposition. An official brief will be submitted by the end of the year and a public enquiry held, which should take about a year to complete. To be viable, said Medemblik, the project would have to start with a storage capacity of 10,000 tonne/year. This would require a workforce of around 30 people.

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## News about New Projects

### DSM STUDIES ETHYLENE, PE EXPANSION AT GELEEN

DSM is studying a major expansion of its Geleen site in the Netherlands, which would include a significant increase in ethylene capacity and two new polyethylene units.

The company is assessing expansion of its Lummus-designed No 4 naphtha cracker to 775,000 tonne/year. The additional ethylene output would be used captively as feedstock for two associated polyethylene units at the same site: a conventional low density polyethylene unit and a swing high density/linear low density unit are proposed. No decision has been taken on capacities, however.

A polypropylene plant, to take the additional propylene output, could be added in 1994 or 1995. Work is currently underway on a 40,000 tonne/year debottlenecking of the No 4 cracker, which is set to raise combined ethylene and propylene capacity to 505,000 tonne/year by late 1990 or early 1991.

DSM is now assessing implementation of Stone & Webster's advanced recovery system (ARS) technology for further expansion to 775,000 tonne/year. Stone & Webster, which has recently completed a feasibility study on the proposed expansion, claims ARS would offer lower investment costs than an equivalent grassroots plant.

DSM says it expects to take a final decision this September. The polyethylene units would only go-ahead if the ethylene expansion is approved. DSM currently produces 600,000 tonne/year of polyethylene and 280,000 tonne/year of polypropylene at Geleen.

### KORUMA EXPANDS CHLOR-ALKALI

As a first step following acquisition by Santral Holding, Turkey's Koruma

Tarim Ilaclari is to increase its chlor-alkali capacity by 25%. A major 50,000 tonne/year chlorine expansion is planned to follow.

The initial \$1.2m expansion, which corresponds to 6,000 tonne/year of chlorine and 6,750 tonne/year of caustic soda, will be achieved by the addition of four mercury cells into the existing cell room. De Nora has been appointed contractor for the work, which is expected to be completed by November.

The company's major chlor-alkali investment will be in membrane technology. A first phase will comprise installation of electrolyzers to produce 25,000 tonne/year chlorine.

These will operate alongside the existing mercury system. At a later date, chlorine capacity will be raised to 50,000 tonne/year. A technology licensor and contractor have yet to be selected.

### BP UPS FRENCH PE

BP Chemicals SNC (Societe on Nom Collectif), the French arm of BP Chemicals, is to invest over FF300m (\$54.9m) in expanding its polyethylene production at Lavera, southeast France.

The major part of the investment will be used to increase the capacity of the two-gas phase lldPE/hdPE production units from 165,000 to 230,000 tonne/year by the third quarter of 1991.

Of the two units, PZ4 currently produces 120,000 tonne/year and PZ3, 45,000 tonne/year. The balance of the investment will improve the production range and costs and build an improved pilot plant.

Additional ethylene feedstock will be available by mid-1991 through expansion of the Lavera steam cracker operated by Naphtachimie, BP Chemicals'

50/50 joint venture with Atochem. Ethylene capacity is currently being increased from 520,000 tonne/year, to 670,000 tonne/year of which 50% will go to BP.

### DOW/PASA SIGN ARGENTINA PS JV

Dow Chemical has signed a letter of intent with PASA Petroquimica Argentina to set up a 50:50 joint venture polystyrene plant at PASA's existing complex at San Lorenzo, Santa Fe.

Preliminary plans call for a 20,000 tonne/year plant, based on Dow technology, to be onstream by 1993. Output will serve both the domestic and export markets.

Feedstock will be supplied from PASA's styrene monomer plant at San Lorenzo, which is currently being expanded from 82,000 to 170,000 tonne/year as part of the company's previously announced \$120m expansion at the site. Most of the additional capacity will be exported.

PASA already has a small 8,000 tonne/year polystyrene manufacturing facility at its Estirenos plant in San Luis. The company also produces around 50,000 tonne/year of styrene butadiene rubber and 2,000 tonne/year nitrile butadiene rubber.

PASA says it is negotiating with the International Finance Corp and other banking institutions to raise necessary finance for the San Lorenzo projects, which also include revamps of benzene, ethylene and ethylbenzene. Rodolfo Dietrich, PASA's planning and development manager, confirmed the selection of UOP technology for the 70,000 tonne/year benzene revamp.

Dow Chemical, with a current worldwide polystyrene capacity of 1.4m tonne/year, is also negotiating a joint venture plant at Pequiven's El Tablazo complex in Venezuela.

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## SOLVAY AWARDS JOHN BROWN ANTWERP PE/PP CONTRACTS

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John Brown is to design and build Solvay's grassroots polypropylene and high density polyethylene plants in Lillo, near Antwerp, Belgium. The multimillion dollar contract is the first awarded to John Brown by Solvay.

Under the contract, John Brown will provide the engineering, procurement and construction management services for both plants. The work will be carried out on a fast-track schedule in the contractor's Netherlands office. Construction is expected to start by the end of the year.

Solvay expects the hdPE plant to come onstream early next year, with the PP plant taking 'a little longer'. John Brown says both plants are scheduled for completion by the fourth quarter of 1991. The 100,000 tonne/year hdPE plant design will be based on proven Solvay/Phillips technology, adding to Solvay's current worldwide hdPE capacity of around 900,000 tonne/year.

A spokesman for Solvay said the company is looking to raise hdPE capacity further, to 1.16m tonne/year, though no decision has been taken on timescale or location. The company has European production at Sarrlebe, France, and Rosegnano, near Livorno, Italy. It also operates a plant at Deer Park, Texas.

The 80,000 tonne/year PP plant at Lillo will use the gas phase fluid bed Unipol process licensed from Union Carbide/Shell Oil (USA). It will add to Solvay's existing 380,000 tonne/year PP capacity at Sarrlebe and Deer Park. The units form part of Solvay's major investment programme at the Lillo site.

The company currently produces chlorine and caustic soda at the site. A 250,000 tonne/year ethylene dichloride

plant, under construction by in-house engineers, is due onstream by the end of the year.

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## AMOCO UPS ETHYLENE USING ARS

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Amoco Chemical is to expand capacity of its ethylene cracker at Chocolate Bayou, near Alvin, Texas, using Stone & Webster's advanced recovery system (ARS) technology. The \$200m expansion, set for completion in early 1994, will increase ethylene capacity by about 272,000 tonne/year and propylene capacity by around 91,000 tonne/year. Current capacities are 1.1m tonne/year and 364,000 tonne/year, respectively.

While Stone & Webster has carried out over 20 feasibility studies for ethylene revamps using ARS technology, and is implementing it in a grassroots ethylene plant in South Korea, the Amoco project will be the first major ARS expansion to go ahead.

'The technology allows the full capacity increase desired by Amoco to be achieved by modifying a single unit', claims Stone & Webster, which is pleased to have the technology, 'endorsed by a major ethylene player'. It is the first time Stone & Webster has worked with Amoco on an olefins project. The cracker was designed by Braun and built in the mid-1970s.

The expansion follows Amoco's deferral of a previously announced 680,000 tonne/year grassroots ethylene facility which was to be built at a US Gulf coast location by M.W. Kellogg by 1992. While an Amoco spokeswoman said the company was still studying the proposal, industry sources say the plant is unlikely to be built.

The expansion will allow Amoco to maintain a strong position in the US Gulf coast merchant ethylene market. The additional propylene output will be used as feedstock for Amoco's recently announced 136,000 tonne/year poly-

propylene unit to be built at the same site.

Stone & Webster is also carrying out a feasibility study to expand the Nor-ethyl ethylene cracker at Bamble, on Norway's southern coast, using ARS technology.

The Linde-designed plant, operated by the Norsk Hydro-Statoil joint venture, has a current ethylene capacity of 400,000 tonne/year. Expansion to 530,000 tonne/year is being considered.

Meanwhile, a similar feasibility study on expansion of the 300,000 tonne/year ethylene cracker operated by Neste Chemicals' Portuguese subsidiary, Neste Productos Quimicos, at Sines is coming towards the end of the first phase.

The company is considering an expansion of the Linde-designed plant to around 440,000 tonne/year using ARS technology.

Alternatively, it may opt for a modest investment in conventional debottlenecking, increasing capacity by only 10-15%. A decision is expected before year end.

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## B & RB WINS TiO<sub>2</sub> DEAL

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US contractor Brown & Root Braun has been awarded phase I engineering for Kerr-McGee's recently announced 60,000 tonne/year grassroots domestic titanium dioxide plant. The contract includes plant design, preliminary engineering and cost estimating to set a target price and project schedule by next April. Plans call for the unit to be onstream by late 1992 or early 1993. Kerr-McGee says the site evaluation process is still continuing, with three sites under consideration. One possibility is Hamilton, Mississippi, where the company already produces 106,000 tonne/year of titanium dioxide. The plant will use Kerr-McGee's own chloride process.

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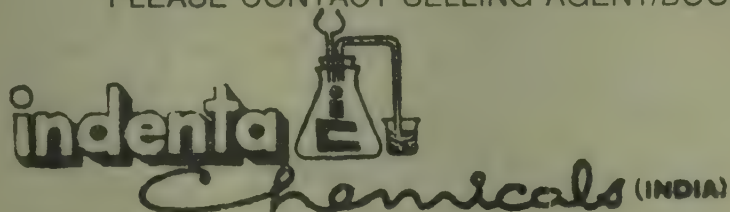
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Acrylamide (Resale)	85.00	Calcium chloride 70% (Solid)	3.25	Ethylene urea	58.00
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Maleic Anhydride (Resale)	42.00	Titanium Dioxide (Anatase)	65.00	Diethyl glycol (DEG) (Resale)	38.00
Mercury (34.5 Kgs)	11,500.00	Titanium Dioxide (Rutile - RCR <sub>2</sub> )	88+ST	Diethyl Phthalate	45.00
Nickel chloride	110.00	Tartaric acid	190.00	Diallyl Phthalate	42.00
Oxalic acid (Resale)	14.00	Trisodium phosphate	12.00	Dimethyl Phthalate	28.00
Peppermint oil (Rectified)	188+Ex+ST	Thiourea	78.00	Diethyl Adipate	52.00
Potassium carbonate (Indian)	28.00	Urea (Tech.)	3.00	Dibutyl Adipate	42.00
Potassium carbonate (Imported)	32.00	Vacuum salt	1.00	Dipentene	15.00
Potassium bichromate	38.00	Zinc Dust	52.00	Dimethylamine 40%	30.00
Potassium phosphate (Mono)	34.00	Zinc Oxide	58.00	Dimethylamine 50%	35.00
Potassium phosphate (Di)	25.00	Zinc chloride powder (Tech.)	20.50	Ethyl Acetate	22.50
Polyvinyl alcohol (No. 117)	93.00	Zinc sulphate	7.00	Ethyl Acrylate	66.00
Polyvinyl alcohol (No. 173)	145.00	<b>SOLVENTS</b>		Ethylene Dichloride	18.50
Polyvinyl alcohol (No. 208)	170.00	<b>Per Kg.</b>		Ethylene Glycol	35.00
Paraformaldehyde (Resale)	20.50	Acetic Acid Glacial (Resale)	14.50	Formic Acid (Imp.)	24.00
Phthalic anhydride (Resale)	42.00	Acetic Anhydride (Resale)	35.00	Formaldehyde (Resale)	6.50
Pentaerythritol (Resale)	49.00	Acetone (Resale)	22.50	Glycerine (CP)	48.00
Paraffin wax	22+ST	Adipic Acid	90.00	Glycerine (IW)	55.00
Rangolite (German)	96+ST	Aceto Acetanilide	50.00	Hydrogen Peroxide 50% (Resale)	39.00
Rangolite (Czech.)	72.00	Aniline Oil (HOC)	48.00	Isopropyl Alcohol	40.00
Rangolite (China)	53.00	Benzoate Plasticiser	62.00	Isobutyl Alcohol (Resale)	35.00
Sodium sulphate (Fine)	3.75	Butyl Acrylate	85.00	Monoethanolamine (Resale)	105.00
Sodium sulphate (Coarse)	3.50	Butyl stearate	38.00	Melamine	60.00
Sodium sulphide 50-52% (Flakes)	11.50+ST	Butanol	34.00	Methyl Ethyl Ketone	42.00
				Methyl Isobutyl Ketone	38.00
				Methyl Acrylate	68.00
				Methylene Dichloride (Resale)	20.00

For Your Requirements Of:

Di Octyl Phthalate (D.O.P.)  
 Di Butyl Phthalate (D.B.P.)  
 Di Butyl Maleate (D.B.M.)

Di Octyl Maleate (D.O.M.)  
 Di Octyl Adipate (D.O.A.)  
 Butyl Stearate

Please Contact Manufacturers:

**SAVITA ORGANIC CHEMICAL INDUSTRIES**

1218, Dalamal Tower, Plot No. 211, Nariman Point, Bombay 400 021.

Phone: 230006, 231192, 233554, 233562

- \* ACTIVATED ALUMINA BALLS, GRANULES & POWDER
- \* ALUMINIUM OXIDE POWDER
- \* MOLECULAR SIEVES TYPE 3A, 4A, 5A & 13X
- \* ACTIVATED CARBON GRANULAR & POWDER
- \* SILICA GEL WHITE & BLUE
- \* SILICA GEL FABRIC BAGS
- \* PRECIOUS METAL CATALYSTS & SALTS like Pd, Pt etc.

**RASHMI DHABUWALA**  
(Authorised Signatory)

## **R.V. CORPORATION**

9, Uttam Chambers, 39, Syed Mukri Street, Katha Bazar, Bombay 400 009.

Phones: 325440/341184

Resi: 6366147

Gram: AMARJYOT, Bombay 400 009.

### **For Your Requirements Of:**

Acetic Acid Glacial  
Alumina Sulphate  
(Iron Free) Lumps, Powder  
Alumina Sulphate  
(Alum) Anhydrous  
Ferric Alum  
Alum Lumps, Powder  
Potash Alum  
Ammonium Chloride  
Ammonia Bicarb  
Bleaching Powder  
Borax Crystals, Granular  
Barium Carbonate  
Caustic Soda Flakes  
Calcium Chloride  
(Solid, Fused, Anhydrous)  
Calcium Carbonate Precipitate  
Citric Acid  
Copper Sulphate

Ferric Chloride (Anhy)  
(Lumps, Powder)  
Ferrous Sulphate  
Diammonium Phosphate  
Glauber's Salt Coarse, Powder  
Magnesium Chloride IP Grade  
Magnesium Sulphate  
(Crystals Technical. IP Grade)  
Manganese Sulphate  
Magnesium Sulphate  
(Dried/Anhy)  
Dextrine Yellow, White  
Malze Starch  
Anilose E  
Oxalic Acid  
Potassium Permanganate  
Potassium Carbonate  
Sodium Sulphide  
(Flakes, Solid, Bits)

Sodium Sulphate  
Sodium Bisulphite  
Sodium Meta Bisulphite  
Sodium Bisulphate  
Sodium Acetate  
(Crystal, Anhydrous)  
Sodium Hexameta Phosphate  
Sodium Metasilicate  
Sodium Nitrate/Nitrite  
Sodium Silicate  
Soda Ash  
Trisodium Phosphate  
Tata Salt  
Water Softening Agent  
Zinc Chloride  
Zinc Oxide  
Zinc Sulphate

Please Contact: **UNION CHEMICAL AGENCY**  
**TEX DYES**

231, Samuel Street, Vadgadi, Bombay 400 003. Tel.: 321462/343117 Grams: 'LAXNAGAR'

### **FOR YOUR REQUIREMENTS FROM READY STOCK**

ACETONE  
DIACETONE  
N-BUTANOL  
ISOBUTANOL  
D.E.G. / E.D.C.  
BENZENE / M.E.G.  
M.E.K. / M.I.B.K.  
TOLUENE  
SODIUM FORMATE  
IPA-CBM

XYLENE  
(ORTHO/PARA/MIX)  
SOLVENTS C-IX (CRUDE)  
NITROBENZENE  
FORMALDEHYDE (37% HOC)  
PHENOL (LIQUID/CRYSTAL)  
ETHYL ACETATE  
BUTYL ACETATE  
ACRYLONITRILE  
(ORIGINAL/REPACK)

N-HEXANE FOOD GRADE  
ANILINE OIL  
FORMIC ACID (IMP)  
PROPYLENE GLYCOL  
STYRENE MONOMER  
VINYL ACETATE  
MONOMER  
and all kinds of  
SOLVENTS &  
CHEMICALS

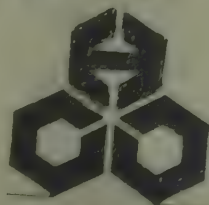
Please Contact:

## **Hiren Chem Corporation**

306, Adamji Building, 3rd Floor, 413-Narshi Natha Street, Bombay 400 009.

Tel: 343426-333692-338139. (R) 5604922.

Branch Office: **SHINE PHARMA CHEM**



D/422-B.G. Tower, 4th Floor, Opp. Delhi Darwaza, Shahi Baug Road, Ahmedabad 380 004. Tel: 20959-24186. (R) 67003-68229

Carbitol	72+ST
Meta Cresol	45.00
Nitrobenzene	19.00
Nitric Acid (Conc.) (RCF)	2.50
Octanol	52.00
Ortho Cresol	30+ST
Phenol (Resale)	40.00
Propylene Glycol	52.00
Polyethylene Glycol (No.200)	75.00
Polyethylene Glycol (No.400)	80.00
Polyethylene Glycol (No.500)	52.00
Polyethylene Glycol (No.1600)	54.00
Polyethylene Glycol (No.4000)	95.00
Polyethylene Glycol (No.6000)	85.00
Para Cresol	120.00
Styrene Monomer	42.00
Sorbitol	14.00
Sulphuric Acid	2.80
Trichloroethylene	26.00
Triethanolamine (Resale)	95.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	55.00

SOLVENTS	Per Litre
Benzene	12.50
N-Heptane	10.50
N-Hexane	11.00
Methanol	8.50
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	18.00
Xylene	24.00

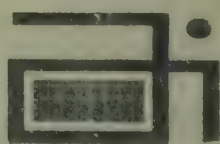
### DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

Alphanaphthylamine	65.00
Alpha Naphthol (Imp.)	150.00
Aceto Acetic Ester (Methyl)	68.00
Ammonium Molybdate	210.00
Anthraquinone	125.00
Anthranilic Acid	82.00
2-Amino 4-Nitrophenol	140.00
Blue B. Base (Local)	305.00
Beta Naphthol (Atul)	62.00
Benzidine Dihydrochloride (BDH)	76.00
Bromamine Acid	500.00
BON Acid (Incl. of excise)	145.00
Chicago Acid (Atul)	360.00
Coach Acid	52.00
C. Acid (Imp.)	210.00
Cyanuric Chloride	160.00
2,4- DNCB	27.00
Dihydrothio PTOS (Imp.)	1,500.00
Dimethyl Aniline	64.00
Diethyl Aniline	140.00
Diamino stilbene	
disulphonic acid	160.00
3,3-DCB (Imp.)	200.00
Gamma Acid (Atul)	200.00
H. Acid (Atul)	110.00
G. Salt	70.00
Isophthalic Acid	50.00
J. Acid	335.00
J. Acid Urea	460.00
K. Acid	110.00
MPDS (German)	200.00

MNA	122.00
Meta Ureido Aniline	175.00
MPD (Local)	160.00
MPD (Japan)	180.00
Naphthenic Acid	46.00
N-Methyl J. Acid	500.00
N-Methyl Aniline	120.00
Naphthalene (Refined)	24.00
Ortho Anisidine (OA) (Imp.)	111.00
Ortho Dichloro Benzene (ODCB)	18.00
OT Base	120.00
Para Dichloro Benzene (PDCB)	28.00
Para Anisidine (PA local)	125.00
PNA	88.00
Para Cresidine (Imp.)	350.00
Para Amino Azo Benzene (India)	135.00
PNCB (HOC)	56.00
Para Amino Acetanilide	200.00
1-Phenyl 3-Methyl	
5-Pyrazolone	135.00
Phenyl J. Acid	360.00
Para Amino Benzoic Acid	135.00
PT Base	122.00
Rhoduline Acid	520.00
Resist Salt 80%	28.00
Resorcinol	255.00
Sodium Naphthionate	66.00
5-Sulpho-Anthranilic Acid	85.00
Sulphanilic Acid	31.00
Sulpho Tobias Acid	140.00
Trichloro Benzene (TCB)	30.00
Tobias Acid (Imp.)	135.00
Metanilic Acid	41.00
MTD	128.00

## We Manufacture Chemicals For Industrial Use

- Acetic Acid
  - Acetic Anhydride
  - Acetaldehyde
  - Industrial Alcohol
- Monochloro Acetic Acid
  - Ethyl Acetate
  - Butyl Acetate
- E D T A
  - N T A
  - Carboxy Methyl Cellulose



### ASHOK ORGANIC INDUSTRIES LTD.

406.Sharda Chambers, 33,Sir Vithaldas Thackersey Marg (New Marine Lines),Bombay-400 20

Phone : 252236 : 252256 : 317511 Gram : 'ASHOKBROS Telex : 11-3853 AOIL IN

#### Also Please Contact:

**Baroda :** Phones : 324519-325769  
Telex 0175-597 AOIL IN  
**Ahmedabad :** Phone : 78009  
**Ankleshwar :** Phone : 2461-2462  
Telex 0189-238 AOIL IN

**New Delhi :** Phones : 5710733-5711057  
**Calcutta :** Phones : 282474-282475  
Telex : 021-7917 SBIL IN  
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Telex : 041-7527 SBIL IN

**Bangalore :** Phones : 570746-570760  
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**Hyderabad :** Phones : 73737-831049  
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**S U L P H U R****SULPHUR POWDER RUBBER GRADE**

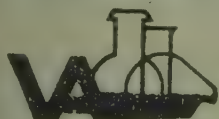
99.5 to 100% pure, free from A.S.T.

**THREE WHEELS BRAND****SULPHUR POWDER EXPLOSIVE GRADE**

99.5% pure, free from A.S.T.

**AGRICULTURE DUSTING POWDER****SULPHUR DUST 85% DP****KISAN BRAND****DOUBLE REFINED ROLL SULPHUR & AMLASAR (CRYSTAL SULPHUR)**

Manufacturers

**M/s. V.A. CHEMICAL AND SULPHUR INDUSTRIES**

8, Fancy Chambers, Plot No. 94, Surat Street, Bombay 400 009.

Tel. Nos: 346989/327244/320370

Telex: 011-76463 DVS IN

Gram: SULFREFINE

**H-ACID****OF INTERNATIONAL STANDARD  
FROM****SHREE HARI CHEMICALS (INDIA) PVT. LTD.****CATERING TO THE NEEDS OF DOMESTIC & EXPORT MARKETS EFFICIENTLY****Bombay Office:** Amrit Niwas, 3rd Floor, 159/2, Cavel Cross Lane No. 6,  
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**ETHYL CELLOSOLVE \* ETHYL CARBITOL**  
**TRICRESYL PHOSPHATE \* CELLOSOLVE ACETATE**  
**BENZYL ACETATE FFC \* BENZYL ALCOHOL FFC**  
**SODIUM BI-SULPHATE \* POTASSIUM BI-SULPHATE**  
**METHYL CELLOSOLVE ACETATE**  
**TRI PHENYL PHOSPHATE**

For Your Requirement Please Contact:

**trade link**

5/363, Mangaldas Building, Trikamji Ghia Marg, 2nd Floor, BOMBAY - 400 002.

**Phone:** 297718/259487; **Resl:** 473310**Gram:** 'POLOSIGHT'**Telex:** 4258 PTK IN

(Prices as on September 10, 1990)

NAPHTHOL COLOURS	Per Kg.
ASG	301.85
AS	205.65
ASSW	379.10
ASBS	253.75
ASBO	266.30
ASD	209.45
ASOL	243.60

ASTR	369.00	Blue H-FRD	305.80	Brill. Purple 2R Hly. Conc.	744.25
ASPH	336.05	Navy Blue H ER	333.75	Brill. Purple 4R Supra Disp.	604.25
ASE	236.00	Blue H 5RX	286.20	Brill. Purple 2R Acra Conc.	779.85
ASEL	249.95	Navy Blue M 3R	355.70	Blue 2R Pdr. Fine	675.30
ASLB	2,002.35	Brill. Blue MR	405.60	Blue BC Acra Conc. Pdr. Fine	1013.15
ASBT	2,459.45	Brill. Blue M RX	214.20	Blue BC Conc. Pdr. Fine	713.65
ASWG	143.00	Brill. Blue M-G	226.45	Blue R Conc. Pdr. Fine	719.70
ASSG	538.65	Blue M 4GD	369.40	Blue Conc. Powder	645.80
ASSR	652.60	Navy Blue M RB	341.85	Brill. Blue 2R Hly. Conc.	378.55
		Turquoise M-G	240.30	Blue RR Supra Powder	629.35
		Brill. Blue M GX	516.25	Brill. Blue 2R Supra Disp.	115.65
<b>PROCION COLOURS</b>	<b>Per Kg.</b>	Blue 3R Acra Powder	718.20	Dark Blue 2R Powder Fine	512.65
		Dark Brown H 6R	248.45	Blue BC Supra Disp.	419.65
Golden Yellow HR	207.95	Cobalt Oxide	285.00	Jade Green XBN Powder Fine	555.80
Brill. Yellow H4G	145.65	Green H 4BD	287.00	Jade Green XBN Acra	
Supra Yellow H-8GP	168.55	Green H-E4BI	169.80	Conc. Pdr.	1026.05
Brill. Yellow HE6G	214.75	Red Brown H IF	143.25	Jade Green 2G Pdr. Fine	533.25
Yellow G-E4R	276.05	Orange Brown H 28	209.05	Jade Green 2G Ptg. Paste	125.40
Brill. Yellow H7G	332.30	Brown M GRN	188.80	Jade Green XBN Ptg. Paste	126.00
Yellow M4R	275.45	Black H-N	314.20	Jade Green 2G Supra Disp.	618.00
Yellow M GR	387.65			Olive D Pdr. Fine	563.90
Brill. Yellow M4G	201.15			Olive Green B Supra Disp.	421.70
Brill. Yellow M8G	366.10	<b>SULPHUR COLOURS</b>	<b>Per Kg.</b>	Jade Green XBN Supra Disp. (N)	327.30
Yellow M 3R	244.70			Olive OMW Pdr. Fine	698.55
Brill. Orange H 2R	303.80	Navy Blue	210.35	Olive OMW Supra Disp.	538.05
Brill. Red H 7B	157.95	Green G	194.55	Olive D Supra Disp.	361.70
Brill. Orange M 2R	313.15	Black Grains Extra	72.25	Olive R Supra Disp.	470.25
Brill. Red H 8B	213.55	Black Grains OG	73.70	Olive D Ptg. Paste	193.00
Brill. Scarlet H RN	245.05	Black GXE Conc.	70.85	Olive Green B Ptg. Paste	199.10
Supra Red H-3BP	179.80	Black GXE	57.90	Olive Green B Acra Conc.	741.10
Brill. Red H-F3B	243.45	Black GXR	69.40	Olive R Acra Conc.	779.85
Brill. Magenta HB	182.00	Black Grains 800	62.80	Brown R Pdr. Fine	869.45
Brill. Red M 5B	160.05	Black EXR Grains	73.70	Dark Brown 3R Fine	826.25
Brill. Red M 8B	218.35	Black EXR Grains 800	59.35	Brown G Supra Disp.	582.05
Brill. Pink MB	137.10			Brown 2G Supra Disp.	716.10
Brill. Magenta MB	163.65			Brown R Supra Disp.	547.35
Brill. Purple H-3R	219.55	<b>VAT COLOURS (ICI)</b>	<b>Per Kg.</b>	Brown BR Powder	867.75
Brill. Purple H-7R	175.40			Dark Brown 3R Ptg. Paste	217.15
Navy Blue H 3R	333.75	Yellow 5G Supra Disperse	561.85	Dark Brown 3R Supra Disp.	529.60
Brill. Blue H-GR	406.40	Yellow 5G Acra Con.	818.60	Brown G Acra Conc.	967.95
Brill. Blue H 5G	207.95	Gold Orange 3G Pdr. Fine	1158.45	Brown M. Powder Fine	768.80
Blue H 5RX	286.20	Brill. Orange 6R Pdr. Fine	624.35	Grey M. Supra Disp.	585.45
Brill. Blue H 7G	213.95	Gold Orange 3G Supra Disp.	693.85	Blue BC Acra Conc. Pdr. Fine	762.70
Brill. Blue H 7RX	358.15	Brill. Orange 6RX Powder	394.30	Direct Black AC Supra Disp.	415.75
Turquoise HA	265.05	Brill. Red 3B Pdr. Fine	1214.15	Direct Black AC Pdr. Fine	574.70
Supra Blue H-3RP	595.30	Brill. Red 3B Supra Disp.	867.45	Direct Black CH Supra Disp.	490.45
Supra Turquoise H 2G P	181.50	Brill. Purple 3R Acra Powder	827.05	Direct ACD Ptg. Paste	217.15

## Delhi Market

**DELHI: SEP:7 (NNS)** Sodium hydro sulphite Kalali jumped up sharply by Rs. 4 at Rs. 46 per kg. in the Delhi chemicals market during last week, on account of dwindling stock., combined with hike in its prices by manufacturers. Damosha and Tamil Nadu hydro flared up by Rs. 5 at Rs. 45 each per kg. due to rise in demand. Similarly Gulshan hydro moved up by Rs. 2.50 at Rs. 41 per kg. owing to increased stock tendency. As a result of non import from Germany, combined with good demand from gur manufacturers and acute shortage of stock, rangolite Germany spurted from Rs. 87 to Rs. 90. Chatkolite edged up by Rs. 2 at Rs. 55 in view of fall in fresh supply. Likewise safolite looked up by Rs. 3 at Rs. 57 due to heavy buying interest from stockists. Ammonia bicarb recorded a gain of Rs. 20 at Rs. 170 per 25 kg. thanks to spurt in demand from bakeries along with paucity of supply. Caustic soda flakes hardened by Rs. 20 at Rs. 535 and soda bicarb Nal rose by Rs. 10 at Rs. 330. Borax granular advanced sharply by Rs. 35 at Rs. 850 in view of dwindling supply. Borax crystal

quoted higher by Rs. 15 at Rs. 875, whereas boric acid technical suffered a steep fall of Rs. 50 at Rs. 515 owing to increased profit taking selling by stockists. Tri sodium phosphate advanced sharply by Rs. 55 at Rs. 625 on account of tight stock and fall in fresh offerings. In view of increased mutual speculation, titanium dioxide RC-822 looked up from Rs. 89 to Rs. 90. Titanium dioxide RCR-2 slipped from Rs. 95 to Rs. 92 in the early part of the week, but later, owing to heavy stockists demand its prices improved sharply and finally settled at Rs. 94, still showing a fall of Re. one per kg. K-brand titanium of Calcutta side ruled quiet at Rs. 62. As a result of increased offerings by stockists and slack demand from Fevicol manufacturers G.H.-17 declined by Rs. 2 at Rs. 133. Hydrogen peroxide moved up by Rs. 100 at Rs. 11, 100 per flask in the absence of demand from consumers. As a result of slack demand from bulk consumers, match wax dropped sharply by Rs. 500 at Rs. 18,500/ton, whereas paraffin wax remained firm at Rs. 1100/50 kg. in view of improved demand from candle manufacturers.

### (DELHI MARKET RATES AS ON SEPTEMBER 7, 1990)

Ammonia Bicarb (Per 25 Kg.)	170.00	Tartaric acid France (Per Kg.)	300.00
Mercury (Per flask)	11,100.00	Sufolite (Per Kg.)	57.00
Soda ash (Per bag)	360/373.00	Chatkolite (Per Kg.)	55.00
Ammonium Chloride (50 Kg.)	120/180.00	DMO (per Kg.)	87.00
Caustic soda flakes (50 Kg.)	535.00	Boric acid Technical (Per 50 Kg.)	1,600.00
Citric acid (Per 50 Kg.)	1,900/2,350.00	Paraffin Wax (Per 50 Kg.)	1,110.00
Stable Bleaching Powder		Slack wax (Per metric tonne)	12,000.00
Shriram (Per 25 Kg.)	101.00	Tartaric Acid (Swastik Per Kg.)	210.00
Stable Bleaching Powder KCl		Borax Granular (Per 50 Kg.)	850.00
(Per 25 Kg.)	90.00	Borax Crystal (Per 50 Kg.)	875.00
Stable Bleaching Powder		Sodium Nitrite (Per 50 Kg.)	1,000/1,100.00
Maruti (Per 25 Kg.)	91.00	Sodium Nitrate (Per 50 Kg.)	500.00
Stable Bleaching Powder		Camphor Thal (Per Kg.)	110.00
Modi (Per 25 Kg.)	92.00	Camphor Powder (Per Kg.)	96.00
Sodium Bicarbonate (50 Kg.)	315/330.00	Menthol Bold (Per Kg.)	335.00
Sodium Hydrosulphite (Per Kg.)	41/46.00	Menthol Medium (Per Kg.)	310.00
Rangolite (Per Kg.)	90.00	Menthol Flake (Per Kg.)	285.00

Mentha Oil (Per Kg.)	195.00
Glycerine (Per Kg.)	55/58.00
Sodium Silicate (Per quintal)	300/400.00
Hexamine (Per Kg.)	34.00
Acetic Acid Glacial (Per Kg.)	13.75
Copper Sulphate	
(Per quintal)	2,300/2,600
Formic Acid (Per Kg.)	24.00
Formaldehyde (Per Kg.)	8.50
Hydrogen Peroxide (Per Kg.)	38.00
Calcium Carbonate	
(Per Tonne)	2,800/5,800
Acid Slurry Soft (Per Kg.)	27.00
Acid Slurry Hard (Per Kg.)	32.00
Phosphoric Acid (Per 50 Kg.)	1,235.00
Potassium Nitrate	
(Per quintal)	1,000/1,250.00
Potassium Permanganate	
(Per 50 Kg.)	2,600/3,000.00
Sodium Bichromate	
(Per 50 Kg.)	1,575/1,600.00
Trisodium Phosphate (50 Kg.)	625.00
Titanium Dioxide Anatase T.T.P.	
(Per Kg.)	65.00
Titanium Dioxide RC-822 (Per Kg.)	90.00
Titanium Dioxide Anatase K-Brand	
(Per Kg.)	62.00
Titanium Dioxide RCR-2 (Per Kg.)	94.00
Zinc Oxide (Per Kg.)	46.00/50.00
Phenol Carbolic Acid (Per Kg.)	39.00
Carbon Tetrachloride (Per Kg.)	24.75
Chloroform (Per Kg.)	28.00
Sodium Sulphate	
(Per metric tonne)	3,600/3,900.00
Naphthalene Balls (Per 50 Kg.)	1,350.00
Match Wax	18,500
Residue Wax	3,800

### DYES & COLOURS (Per Kg.)

Naphthol AS	175/211.50
Naphthol ASG	180/249.70
Naphthol ASBS	210/260.75
Naphthol ASTR	300/378.92
Naphthol ASOL	210/250.90
Naphthol ASBO	195/274.30

### DIRECT DYES (Per Kg.)

Black E. Conc.	120/185.30
Diazo Black B.T.	105/154.50
Green B	90/147.55
Blue 2-B	60/107.00
Blue 2-B 225% (JNR)	125.00
Sky Blue FB	160/248.20
Basic Auramine	55/110.00
Basic Rhodamine	300/425.00
Basic Methylene Blue	100/180.00
Basic Violet	165/210.00
Basic Malachite Green	175.00
Acid Orange	75/111.20
Congo Red H/C	75/120.95

# Madras Market

There is an upward swing in the market presumably for no reason. Solvent prices have shot up noticeably. Ethyl Acetate was quoted Rs. 21/- against last week's rate of Rs. 18/-. Similarly, Acetic Acid prices were Rs. 2/- higher than the previous week. On account of shut down at NOCIL plant, NOCIL products were in demand specially IPA whose price went upto Rs. 36/kg. Butyl

Acetate prices were also high.

There was good upcountry demand for MEK pushing its prices to Rs. 38/-. There has not been much change in the inorganic chemicals prices. The market is expecting a steep price increase in petroleum products on account of Gulf surcharge that may be imposed by the Government any moment.

## (MADRAS MARKET RATES AS ON SEPTEMBER 8, 1990)

Acetic Acid Glacial (per kg)	16.00
Aluminium Sulphate Iron free (per MT)	4,000.00
Ammonium Bicarbonate (per 25 kgs)	160.00
Ammonium Chloride (per MT)	2,450.00
Acid Slurry (per kg)	31.50
Barium Carbonate (per kg)	10.50
Barium Chloride (per kg)	9.50
Boric Acid Technical (per kg)	27.00
Bleaching Powder (per 50 kgs)	210.00
Borax (per 50 kgs)	785.00
Caustic Soda Flakes -- Mettur Chemicals (per MT)	11,500.00
Caustic Soda Flakes -- Andhra Sugars (per MT)	11,500.00
Calcium Chloride 70% Solid (per MT)	3,500.00
Calcium Chloride Anhydrous (per MT)	6,000.00
Calcium Carbonate (Activated) (per MT)	6,500.00
Calcium Carbonate (Precipitated) (per MT)	5,600.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	135.00
Pure Para Cresol 96% (per kg)	90.00
Meta Para Cresol 42% (per kg)	51.00
Formic Acid (per kg)	27.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.00
Glycerine I.W. (per kg)	51.00
Hydrosulphite of Soda (TCPL) (per kg)	38.00
Hydrosulphite of Soda (IDI) (per kg)	42.00

Hydrosulphite of Soda (BASF) (per kg)	48.00
Hexamine (per kg)	31.50
Hyflosupercell (per kg)	23.00
Hydrogen Peroxide (per kg)	38.00
Litharge (per kg)	38.00
Lead Acetate (per kg)	38.00
Magnesium Carbonate (per kg)	18.00
Magnesium Chloride (per kg)	3.90
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	345.00
Oxalic Acid (per kg)	20.00
Paraffin Wax (per kg)	18.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	29.00
Polyvinyl Alcohol Powder (per kg)	140.00
Pentaerythritol (per kg)	52.00
Phthalic Anhydride (per kg)	36.00
Soda Ash (TAC) (per 75 kgs)	410.00
Soda Ash (TATA) (per 75 kgs)	410.00
Sodium Bicarbonate (TATA) (per 50 kgs)	385.00
Sodium Silicate (per MT)	3,750.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	24.00
Sodium Sulphide Flakes (per kg)	20.00
Sodium Bisulphite (per kg)	8.00
Sodium Alginate (per kg)	295.00
Sodium Acetate (per kg)	7.50
Sodium Sulphate (Anhydrous) (per kg)	4.00
Titanium Dioxide (Anatase) (per kg)	63.00
Titanium Dioxide (Rutile) (per kg)	85.00
Trisodium Phosphate (per kg)	10.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	52.00

## CALCUTTA MARKET (Prices as on Sep. 9, 1990)

Acetic acid (per 50 kg)	750.00
Basic chrome sulphate (per 50 kg)	800.00
Benzene (litre)	11.50
Bleaching powder (bag)	235.00
Borax granular (per 50 kg)	800.00
Boric acid (per 50 kg)	1,625.00
Camphor (per kg)	102.00
Caustic soda lye (per ton)	10,020.00
Caustic soda flakes (per 50 kg)	560.00
Glycerine (per kg)	53.50
Menthol bold (per kg)	570.00
Menthol medium (per kg)	380.00
Menthol small (per kg)	300.00
Phosphoric acid (per 50 kg)	1,400.00
Phenol (per kg)	38.50
Soda ash (75 kg)	395.00
Sodium bichromate (per 50 kg)	1,500.00
Sodium bicarbonate (per 50 kg)	340.00
Sodium nitrate (per 50 kg)	450.00
Sodium sulphate anhydrous (per 50 kg)	320.00
Sulphuric acid (per ton)	2,200.00
Trisodium phosphate (per 50 kg)	610.00
Toluene (litre)	16.50

Zinc Chloride Powder (per kg)	14.00
Zinc Sulphate (per kg)	8.50

## SOLVENTS

Acetone -- HOCL (per kg)	18.50
Butanol (per kg)	37.00
Butyl Acetate (per kg)	44.00
Benzene (per lit)	14.00
Cellosolve (per kg)	65.00
Carbon Tetra Chloride (per kg)	23.00
Chloroform (per kg)	28.00
Diacetone Alcohol (per kg)	30.00
Diethylene Glycol (per kg)	32.00
Dichloroethane (per kg)	18.00
Di-octyl Phthalate (per kg)	48.00
Di-N-butyl Phthalate (per kg)	48.00
Ethyl Acetate (per kg)	21.00
Isopropyl Alcohol (per kg)	36.00
Methanol (per kg)	10.00
Methylene Chloride (per kg)	23.00
Methyl Ethyl Ketone (per kg)	38.00
Methyl Isobutyl Ketone (per kg)	42.00
Phenol (per kg)	38.00
Sorbitol (per kg)	15.00
Triethanolamine (per kg)	90.00
Trichloroethylene (per kg)	26.50
1-1-1 Trichloroethane (per kg)	29.00
Turpentine (per lit)	16.00
Toluene (per lit)	14.00
Xylene (per lit)	22.00

# Shipping News

## VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Approx. sailing dt. (5)
15/9	Bravo Sif (Voy-639)	Patvolk/P&O/ S.W. & Co. Trident/ Seaspeed	S. American Ports. (Carting at T.P. No. 4 for S.W. & Co. & Trident & T.P. No. 3 for P & O) (Carting at Hay Bunder No. 4 for Patvolk) New York; Norfolk; Savannah; Baltimore; Boston; Charleston; Houston. New York; Baltimore; Norfolk; Savannah; Charleston; Houston & S. American Ports. (Carting at M-178 Cotton Depot).	19/9
22/9	CMB Mallet (Nhava Sheva)	C.M.B.	Norfolk; New York; Baltimore; Philadelphia; Charleston; Savannah; Houston; Miami; New Orleans Via Antwerp; Montreal; Toronto; Halifax. (Carting at Kalamboli)	24/9
18/9	Maersk Clementine (Sing)(V-9018)	Maersk Agency	New York; Philadelphia; Baltimore; Norfolk; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston; Toronto; Montreal; Chicago; Atlanta; Denver; Dallas; Wilmington; Milwaukee; Detroit; Minneapolis; Memphis; Nashville; Cleveland; Phoenix; Boston; Los Angeles; Vancouver; Seattle; San Francisco; Portland; Longbeach; Mexican & S. American Ports. (Carting at 19-ID).	22/9
19/9	Kabirdas (Ind)	S.C.I.	New York; Baltimore; Savannah; Norfolk; Charleston; Houston; Jacksonville; New Orleans; Boston; P. Everglades. (Carting at B. Pier Extn.)	23/9
19/9	Ever Bridge (Voy-038)	Greenways	New York; Newark; Baltimore; Charleston; New Orleans; Houston; Boston; Providence (RI); Philadelphia; Norfolk; Savannah; Jacksonville; Wilmington; Miami; Montreal; Toronto; Bermuda; Los Angeles; Longbeach; San Francisco; Oakland; San Diego; Stockton; Richmond; Almeida; Redwood City; Sacramento; Seattle; Portland; Vancouver (B.C.); Tacoma; Longview; Chicago; Dallas; Various inland destinations and Caribbean Ports. (Carting at G/H Cotton Depot).	25/9
20/9	Hoegh Dyke	Patvolk	Montreal & Toronto via Halifax; New York; Boston; Norfolk; Charleston; Houston; Savannah; Wilmington; Philadelphia; Baltimore; New Orleans; & FCL Chicago; Milwaukee; Atlanta; Dallas. (Carting at H.B. No. 5).	25/9
28/9	Stonewall Jackson (Ame)	M.S.P.L.	Philadelphia; Baltimore; Norfolk; New Orleans; Houston; Savannah; New York. (Carting at P/Q-PD).	29/9
15/9	Bravo Sif	Patvolk/P&O/ S.W. & Co./ Seaspeed	West African Ports. (Carting at T.P. No. 3 for P&O & No. 4 for S.W. & Co.) (Carting at Hay Bunder No. 4 for Patvolk). West African Ports. (Carting at M-178 Cotton Depot)	19/9
22/9	CMB Mallet (Nhava Sheva)	C.M.B.	Lagos; Abidjan; Lome; Douala; Matadi; Port Gentil; Pointe Noire; Nouakchott; Cotonou; Dakar; Luanda; Monrovia; Tema via Antwerp. (Carting at Kalamboli).	18/9
18/9	Maersk Clementine	Maersk Agency	Lagos/Apapa; Dakar; Freetown; Monrovia; Lome; Cotonou; Doula; Tema. (Carting at 19-ID).	22/9
21/9	Oyster Bay (Voy-4053)	Arebee	Lagos/Apapa; P. Harcourt; Abidjan; Tema; Takoradi; Monrovia; Lome; Freetown; Cotonou; Douala; Matadi. (Carting at M-Jetha C.D.).	23/9
14/9	Ville De Dubai (Ger) (V-2122)	C.M.A.	Alexandria; Marseilles; Istanbul; Lisbon; Barcelona; Le Havre; Hamburg; Felixstowe; Thames Port (London); Rotterdam; Antwerp; Limassol; Latakia; Tunis; Copenhagen; Aarhus; Gothenburg; Stockholm; Helsinki; Belfast. (Carting at E-Grain Depot).	20/9
15/9	Bravo Sif (Voy-639) (Dan)	Merzario/ Seaspeed/ S.W. & Co./ Trident/ P&O/	Jeddah; Hodeidah; P. Sudan; Ravenna; Ancona; Piraeus; Venice; Trieste. (Carting at M.O.D. No. 2). Tilbury; London; Felixstowe; Manchester; Liverpool; Avonmouth; Le Havre; Rotterdam; Hamburg; Antwerp; Bremerhaven and Sandinavian Ports. (Carting at M-178 Cotton Depot) Tilbury; London; Felixstowe; Avonmouth; Manchester; Liverpool; Glasgow; Leeds; Birmingham; Dublin; Belfast; Bristol; Marseilles; Genoa; Barcelona; Le Havre; Antwerp; Rotterdam; Hamburg; Bremerhaven; Copenhagen; Oslo; Helsinki; Malmao; Gothenburg; Stockholm; Aarhus; Alborg. (Carting at T.P. No. 4 for S.W. & Co. Trident & T.P. No. 3 for P&O).	19/9

(1)	(2)	(3)	(4)	(5)
22/9	CMB Mallet (Nhava Sheva)	Patvolk C.M.B./ Merzario	U.K.; N. Continent & Med. Ports. (Carting at Hay Bunder No. 4). Port Sudan; Jeddah; La Spezia; Valencia; Genoa; Barcelona; Marseilles; Tunis; Casablanca; Tangier; Alexandria; Piraeus; Mersin; Limassol; Felixstowe; London; Liverpool; Manchester; Birmingham; Avonmouth; Dublin and all inland destinations in U.K.; Antwerp; Rotterdam; Hamburg; Bremen; Leixoes; Lisbon; Copenhagen; Oslo; Gothenburg; Stockholm; Malmao; Aarhus; Helsinki. (Crtg. at Kalamboli for both).	24/9
18/9	Maersk Clementine	Maersk Agency	Leghorn; Marseilles; Naples; Barcelona; Bilbao; Bordeaux; Alicante; Genoa; Valencia; Bremen; Jeddah; Antwerp; Rotterdam; Bremerhaven; Hamburg; U.K. & Scandinavian Ports. (Carting at 19-ID).	22/9
19/9	Kabirdas (Ind)	S.C.I.	Felixstowe; Hamburg; Rotterdam; Antwerp; Bremen; Liverpool; Manchester; Avonmouth; London; Belfast; Aarhus; Oslo; Helsinki; Copenhagen; Gothenburg and all Inland destinations. (Carting at B. Pier Exten.)	23/9
19/9	Ever Bridge (V-038) (Pan)	Greenways	Hamburg; Felixstowe; Rotterdam; Antwerp; Le Havre; London; Liverpool; Leixoes; Lisbon; Manchester; Avonmouth; Wembly; Birmingham; Leeds; Leicester; Amsterdam; Bremen; Copenhagen; Aarhus; Gothenburg; Oslo; Stockholm; Helsinki; Belfast and all destinations in U.K.; Germany; Switzerland and Austria. (Carting at G/H Cotton Depot).	25/9
21/9	Oyster Bay	P&O/ Arebee	Assab; Djibouti; P. Sudan. (Carting at Timber Pond No. 3). P. Said; Alexandria; Piraeus; Venice; Trieste; Genoa; Koper; Naples; Fos; Barcelona; Valencia; Ravenna; Livorno; Las Palmas; Limassol; Constanza; Budapest. (Carting at M-Jetha Cotton Depot).	23/9
28/9	Stonewall Jackson	M.S.P.L.	Assab; P. Suez; (Alexandria). (Carting at P/Q-PD).	29/9
18/9	Maersk Clementine (Sin)(V-9018)	Maersk Agency	Penang; Singapore; Hongkong; Keelung; Kaohsiung; Busan; Main Japan Ports; Manila; Jakarta; Surabaya; Bangkok; P. Kelang; Chinese Ports; (Carting at 19-ID).	22/9
19/9	Ever Bridge (V-038)(Pan)	Greenways	Singapore; Penang; Port Kelang; Bangkok; Djakarta; Surabaya; Manila; Cebu; Kaohsiung; Keelung; Osaka; Yokohama; Kobe; Shimizu; Moji; Nagoya; Busan; Hongkong. (Carting at G/H Cotton Depot).	25/9
28/9	Stonewall Jackson	M.S.P.L.	Singapore; P. Kelang. (Carting at P/Q-PD).	29/9
12/9	Ermioni	Jades Ship	Dubai	25/9
14/9	Ville De Dubai	C.M.A.	Dubai; Mina Qaboos; Abu Dhabi; Bahrain; Doha; Dammam; Riyadh. (Carting at E-Shed Grain Depot).	20/9
15/9	Bravo Sif (Voy-639)	Penguin/ Merzario/ O.S.A./ Seaspeed/ Kanika/ Parekh	Dubai; Abu Dhabi; Sharjah; Doha; Muscat; Jebel Ali; Bahrain. (Carting at H.B. No. 4). Dubai; Sharjah; Abu Dhabi; Muscat; Doha; Dammam; Bahrain. (Carting at M.O.D. No. 2). Dubai; Abu Dhabi; Bahrain; Doha; Muscat; Dammam. (Carting at M/178-180 Cotton Depot). Dubai; Dammam; Bahrain; Doha. (Carting at M-178 Cotton Depot). Dubai; Abu Dhabi; Sharjah; Muscat; Bahrain. (Carting at T.P. No. 3). Muscat; Dubai; Sharjah. (Carting at Timber Pond No. 3). Dubai; Dammam; Muscat; Bahrain; Riyadh; Doha. (Carting at 19-ID).	19/9
18/9	Maersk Clementine	Maersk Agency	Dubai; Muscat.	22/9
18/9	Rossana (Ind)	Mackintosh	Dubai; Muscat.	26/9
20/9	Lanka Mahapola (Sri L.)(V-98)	Seahorse	Dubai; Sharjah; Muscat; Dammam; Riyadh; Sallalah; Doha; Abu Dhabi; Bahrain. (Carting at M.O.D. No. 3).	22/9
22/9	CMB Mallet (Nhava Sheva)	C.M.B./ Merzario	Dubai; Abu Dhabi; Bahrain; Dammam; Doha. (Carting at Kalamboli for both).	24/9
20/9	K. Medvetkiy	Sai Ship	Mogadiscio; Mombasa; Dar Es Salaam; Beira; Maputo.	25/9
20/9	Any	SDS Corp.	P. Louis; Tamatave; Re Union.	27/9
21/9	Oyster Bay (V-4053)	Arebee/ P&O	Dar Es Salaam & Mombasa (Direct); Kampala; Jinja; Toronto; Lugazi; Entebbe (Uganda); Kigali (Rwanda); Kitwe; Lusaka; Ndola (Zambia); Lilongwe; Blantyre (Malawi); Maputo; Zanzibar. (Carting at M.J. Cotton Depot). Mombasa; Dar Es Salaam (Direct); Beira; Mahe & Inland destinations in East Africa. (Carting at Timber Pond No. 3).	23/9
22/9	CMB Mallet (Nhava Sheva)	C.M.B.	Dar Es Salaam; Mombasa (Direct); Nacala; Tanga; Kampala; Blantyre; Lusaka; Ndola; Matwara; Lilongwe and all inland destinations in East Africa. (Carting at Kalamboli).	24/9

## VESSELS DUE FOR IMPORT DISCHARGE

Due Date	Steamer's Name	Agents	From
22/9	CMB Mallet (Nhava Sheva)	C.M.B.	UK Cont./US/Med./East Africa
25/9	Gur Maiden	I.S.S. Co.	U.K. Cont.
20/9	Hoegh Dyke	Patvolk	U.S.A.
26/9	Ibn Al Moataz	Transworld	S. America
22/9	Ibn Abdoun	Transworld	S. America
22/9	Ionian Express	S.C.I.	U.S./Canada
25/9	Jala Gopal	S.C.I.	U.S./Canada
28/9	Jala Tapi	S.C.I.	U.S./Canada
20/9	K. Medvetskiy	Sai Ship	E. Africa
19/9	Kabirdas	S.C.I.	U.K. Cont./U.S.
21/9	Oyster Bay	P&O	E. Africa
30/9	Star Rover	S.W. & Co.	U.S./Canada
28/9	Stonewall Jackson	M.S.P.L.	U.S.A.

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## PLASTIC MATERIALS IMPORTED BOMBAY (From 15.5.90 to 17.5.90)

HDPE: From Argentina: Puri Electronics Private Limited, 50 Mts., Rs. 7,41,685; Newton Plastics Inc., 25 Mts., Rs. 3,70,842; Polychoric Industries, 60 Mts., Rs. 10,42,378; Polychoric Industries, 40 Mts., Rs. 7,28,252; From Czechoslovakia: Associated Plastics Inds., 12,500 Mts., Rs. 1,42,031; Hardik Industrial Corporation, 12.50 Mts., Rs. 1,42,031; Hardik Industrial Corporation, NA, Rs. 1,42,031; Associated Plastics Industries, 12,500 Mts., Rs. 1,42,031; From Japan: Fibroza Industries, 16.5 Mts., Rs. 2,83,667; Kanpur Plastipak Limited, 18 Mts., Rs. 3,00,225; Jhaveri Polymers Private Limited, 10 Mts., Rs. 1,88,367; Vijaya Woven Sack Private Ltd., 16,500 Mts., Rs. 2,83,034; From Korea: Bajaj Plastics Limited, 160 Mts., Rs. 26,07,267; Paharpur Plastics, 272 Mts., Rs. 44,51,477; Transworld Polymers Pvt. Ltd., 16 Mts., Rs. 2,62,095; From Saudi Arabia: Stylopach, 17,150 Mts., Rs. 2,87,319; Calcutta Industries Corporation, 51,450 Mts., Rs. 7,90,130; Calcutta Rope Store, 51,450 Mts., Rs. 8,11,081; Columbia Leasing & Finance Limited, 120.05 Mts., Rs. 16,96,982; Fibro Plast Corporation, 24,750 Mts., Rs. 3,40,391; Tirupati International, 17 Mts., Rs. 2,36,710; Tirupati International, 8,250 Mts., Rs. 1,14,874; From Taiwan: Himar Fab. & Pkg Private Limited, 51,000 Kgs., Rs. 8,72,497; From USA: Radhika Enterprise, 17,500 Mts., Rs. 2,29,050; Radhika Enterprises, 16,375 Mts., Rs. 2,14,325; From Yugoslavia: Fortuna Agencies, 15 Mts., Rs. 82,745; Fortuna Agencies, 15 Mts., Rs. 82,745; Grover Overseas Pvt Ltd., 30 Mts., Rs. 5,07,268; Pan Asia Intl. Pvt. Ltd, 5 Mts., Rs. 84,569; Pan Asia International Private Limited, 5 Mts., Rs. 84,575; Fortuna Agencies, 5 Mts., Rs. 82,745.

LINEAR LOW DENSITY POLY ETHYLENE: From Netherlands: HGF Laminates, 20 Mts., Rs. 3,08,890; From Saudi Arabia: Alliance Plastics Pvt. Ltd., 16,500 Mts., Rs. 2,41,876; Uniplast India Ltd., 47,600 Mts., Rs. 7,31,004; From USA: Suvin Coextrusion Pvt. Ltd., 16 Mts., Rs. 2,34,757.

POLYACETYL RESIN: From Japan: Anjali Plastics, 10 Mts., Rs. 3,66,480; Anjali Plastics, 7 Mts., Rs. 2,56,536.

POLYPROPYLENE: From Australia: Kay Polyplast Ltd., 64 Mts., Rs. 8,37,668; Primo Pick N Pack Pvt. Ltd., 32 Mts., Rs. 4,18,834; From Finland: Supreme Inds., Ltd., 17 Mts., Rs. 2,46,239; Shikhar Polytex Pvt. Ltd., 32 Kgs., Rs. 4,63,510; From Korea: Gem Properes Pvt. Ltd., 33 Mts., Rs. 4,86,334; From Japan: Ishwar Arts, 18 Mts., Rs. 1,80,187; Milton Plastics, 60 Mts., Rs. 8,40,205; From Japan:

Milton Polyplast (I) Ltd., 45 Mts., Rs. 6,30,403; Milton Plastics, 4 Mts., Rs. 51,482; Milton Plastics, 10 Mts., Rs. 1,28,905; Rising Star Plastics Pvt. Ltd., 45 Mts., Rs. 6,30,403.

POLYPROPYLENE: From Spain: Bajaj Plastics Ltd., 66 Mts., Rs. 9,44,470; Bright Brothers Ltd., 33 Mts., Rs. 5,47,102; From USA: Bajaj Plastics Ltd., 199.8 Mts., Rs. 2,71,386; Balumal Sons, 62.914 Mts., Rs. 8,16,580; Flour & Food Ltd., 85 Mts., Rs. 12,24,275; Fortuna Agencies, 16,650 Mts., Rs. 2,31,692; Fortuna Agencies, 33,300 Mts., Rs. 4,63,382; Fortuna Agencies, 49,950 Kgs., Rs. 6,95,074; Garware Wall Ropes Ltd., 99,900 Mts., Rs. 12,20,377; Godavari Polychem Ltd., 34 Mts., Rs. 4,92,478.

POLYPROPYLENE HOMO POLYMER: From Canada: Orient International, 105 Mts., Rs. 14,20,111.

POLYSTYRENE: From Korea: Ashoka Insulations, 12 Mts.,

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**POLYTERPENE RESIN:** From Germany: Beirsdorf (India) Ltd., 8,000 Kgs., Rs. 4,97,916.

**POLYSTYRENE:** From Saudi Arabia: Indo Sewing Ltd., 17 Mts., Rs. 2,96,674; From Korea: Sureka Insulation & Packings, 48 Mts., Rs. 11,64,182.

**PTFE:** From Germany: Mechanical Packaging Inds. Ltd., 1,000 Kgs., Rs. 2,26,868.

**PVC:** From Brazil: Raj Pipes Ltd., 144 Mts., Rs. 16,91,233; Shakago Commercial & Industries Corpn., 64 Mts., Rs. 7,49,789; Vinyl Tubes Ltd., 80 Mts., Rs. 9,65,787; From Germany: Caprihans India Ltd., 3,200 Mts., Rs. 93,172; From Hungary: Maruthi Plastics Udyog Pvt. Ltd., 30,900 Kgs., Rs. 3,60,323; From Mexico: Thor Polymers Pvt. Ltd., 50 Mts., Rs. 5,97,225;

Thor Polymers Pvt. Ltd., 50 Mts., Rs. 5,97,225; 100 Mts., Rs. 11,94,450; Star Oxide & Chemicals Pvt. Ltd., 100 Mts., Rs. 11,94,450; Star Oxides & Chemicals Pvt. Ltd., 33.3 Mts., Rs. 3,97,752; From Romania: International Polymers, 50 Mts., Rs. 5,84,528; Movilex Polymers Pvt. Ltd., 100 Mts., Rs. 11,74,462; From Japan: Chloride Inds. Ltd., 28 Mts., Rs. 5,57,457; From Turkey: Grover Overseas Pvt. Ltd., 51,846 Mts., Rs. 6,33,558; Grover Overseas Pvt. Ltd., 25.923 Mts., Rs. 3,16,679; Grover Overseas Pvt. Ltd., 24.796 Mts., Rs. 3,02,910; Grover Overseas Pvt. Ltd., 396.739 Mts., Rs. 48,36,560.

#### DRUGS MATERIALS IMPORTED BOMBAY (From 15.5.90 to 17.5.90)

**CITRIC ACID MONOHYDRATE** BP 80: From China: Universal Chemical, 20,000 Kgs., Rs. 2,56,536.

**BUTYLATED HYDROXY ANI-**

**SOLE BP:** From Japan: Nalvalala & Co., 240 Kgs., Rs. 61,035.

**FURALTADONE HCL MONO-HYDRATE:** From Italy: Rohan Medvat Pvt. Ltd., 385 Kgs., Rs. 1,02,862.

**D-PANTHENOL USP:** From Japan: Rallis India Ltd., 500 Kgs., Rs. 1,36,819.

**PROPYLENE GLYCOL USP:** From Japan: Raptakos Brett & Co. Ltd., 16.17 Mts., Rs. 2,73,723.

**3,4,5 TRIMETHOXY BENZAL-DEHYDE:** From China: Parag Pharmaceuticals Pvt. Ltd., 3,000 Kgs., Rs. 12,12,000.

#### MATERIALS EXPORTED BOMBAY (From 18.2.90 to 23.2.90)

**ACETIC ACID 99% TECH:** To Bangkok: Bapul Chemicals Pvt. Ltd., 280 Kgs., Rs. 47,421.

**BETA NAPHTHOL:** To Hamburg: Beta Naphthol Pvt. Ltd., 15,000 Kgs., Rs. 6,36,063.

**DICALCIUM PHOSPHATE:** To Osaka: Nayankumar & Co., 2,500 Kgs., Rs. 1,03,829.

**2,5, DICHLORO SULFO PHENYL 3 METHYL 5 PYRAZOLONE:** To Genoa: Anil Dye Chem Industries, 3,850 Kgs., Rs. 4,04,374.

**DIETHYL META AMINO PHENOL:** To Piraeus: Navin Chem Inds., 1,000 Kgs., Rs. 1,81,300.

**2,4, DI NITRO ANILINE:** To New York: Nanavati Services Pvt. Ltd., 1,26,951 Kgs., Rs. 7,30,213.

**FORMOSULPHATHIAZOLE:** To Rotterdam: Hindustan Giba Geigy, 1,100 Kgs., Rs. 4,14,825.

**GAMMA ACID:** To Gdansk: Metro Exports, 775 Kgs., Rs. 1,62,000.

**H-ACID (DRY):** To New York: Atul Products Ltd., 10,000 Kgs., Rs. 7,91,882; To Busan: Jeevan Products, 2,400 Kgs., Rs. 1,95,494.

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To Hamburg: Sajjan Impex Pvt. Ltd., 39,000 Kgs., Rs. 35,99,672; Sajjan Impex Ltd., 15,350 Kgs., Rs. 12,28,818; To New York: Vapi Products Inds., 5,100 Kgs., Rs. 3,77,276; Zenith Ltd., 27,000 Kgs., Rs. 21,45,195; To Busan: Zenith Ltd., 13,350 Kgs., Rs. 9,59,037.

HYDROCHLORIC ACID: To Singapore: Prestige HM Polycontainers, 19.6 Mts., Rs. 42,948.

HYDROGEN PEROXIDE: To Bangkok: National Peroxide Ltd., 102.960 Kgs., Rs. 8,70,000.

MANGANESE DIOXIDE: To Keelung: Indus. Chem Agencies, 10,500 Kgs., Rs. 5,93,191.

METHYL PARATHION: To Bangkok: Bayer India Ltd., 36,000 Kgs., Rs. 23,00,426.

METANILIC ACID: To New York: Sadhana Nitro Chem Ltd., 18,000 Kgs., Rs. 7,99,406.

O-TOLIDINE: To Keelung: Jindal Dye Intermediates, 11,974 Kgs., Rs. 8,15,765.

OXALIC ACID: To Rotterdam: Excel Industries Ltd., 40,000 Kgs., Rs. 5,44,681.

PENTAERYTHITOL 98%: To Felixstowe: Kanoria Chem & Intls, 20,000 Kgs., Rs. 3,20,454.

PHOSPHOROUS TRICHLORIDE: To Busan: Excel Industries Ltd., 38,400 Kgs., Rs. 5,94,043.

R SALT: To New York: Atul Products, 3,000 Kgs., Rs. 4,32,987.

SODIUM FORMALDEHYDE SULPHOXYLATE: To Charleston: Demosha Chemicals Pvt. Ltd., 16,000 Kgs., Rs. 4,42,553.

SODIUM NAPHTHIONATE: To New York: Vapi Products Inds., 2,759 Kgs., Rs. 1,20,553.

SODIUM SULPHONATE: To Felixstowe: Jeevan Products, 7,000 Kgs., Rs. 18,39,303.

SULPHO TOBIAS ACID: To New

York: Vivid Exports, 3,880 Kgs., Rs. 2,24,080.

SULPHUR BLACK (SOLU): To Genoa: Chika Ltd., 1,000 Kgs., Rs. 43,575.

VINYL SULPHONE: To New York: Jindal Dye Intermediates; 18,760 kgs., Rs. 15,43,829.

VINYL SULPHONE ACETANILIDE BASE: Sagar Drugs & Pharmaceuticals, 18,200 Kgs., Rs. 15,51,072.

#### DRUGS MATERIALS EXPORTED BOMBAY (From 18.2.90 to 23.2.90)

CALCIUM LACTOBIONATE: To Antwerp: Sandoz (I) India Ltd., 57.36 Kgs., Rs. 11,36,215.

CAPTAFLOR TECH: To Busan: Rallis India Ltd., 15 Mts., Rs. 15,46,672.

FERROUS FUMARATE BP 80: To London: Anufar Chemicals, 2,000 Kgs.,

Rs. 96,445.

FURAZOLIDONE: To Odessa: Rushina Pharmaceuticals, 40,000 Kgs., Rs. 32,40,000.

ISONIAZID ACID BP'80: To Hamburg: Salpra Pharmaceuticals, 1,000 Kgs., Rs. 1,54,536.

MEBENDAZOLE USP XX: To Milan: Tata Pharma, 1,000 Kgs., Rs. 4,34,042.

METRONIDAZOLE BENZOATE IP: To Hamburg: Unichem Labs Ltd., 2,500 Kgs., Rs. 5,66,000.

POTASSIUM IODIDE BP/USP: To Istanbul: Amphray Laboratories, 10,000 Kgs., Rs. 26,63,829.

SULPHAMETHOXAZOLE BP: to Barcelona: Indian Gum Industries, 4,000 Kgs., Rs. 8,68,106.

SULPHAMETHOXAZOLE BP: To Vietnam: Lyka Labs, 7,500 Kgs., Rs. 19,02,127.

THIACETAZONE: To Hamburg: Unichem Labs Ltd., 1,000 Kgs., Rs. 2,14,00.

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**ACID BLACK:** To Genoa: Metro Chem Inds., 1,700 Kgs., Rs. 1,63,489.

**ACID GREEN 16:** To Hamburg: French Dyes and Chemicals, 200 Kgs., Rs. 65,600.

**ACID RED 1:** To New York: Ravi Chem Dye, 4,000 Kgs., Rs. 4,30,880; To Priok: Uni Impex, 1,000 Kgs., Rs. 1,57,404.

**ACID RED 18:** To Genoa: Karsandas Mavji, 500 Kgs., Rs. 43,818.

**ACID RED 131:** To Genoa: Colour Synth, 500 Kgs., Rs. 102,457; To Felixstowe: Colour Synth (I) Pvt. Ltd., 1,000

Kgs., Rs. 2,04,914.

**ACID VIOLET 54:** To Genoa: Chika Ltd., 150 Kgs., Rs. 3,983.

**CHROME BLACK T:** To Busan: 500 Kgs., Rs. 65,617.

**DIRECT BLACK 38:** To Kaoshiung: Supreme Dyes, 2,000 Kgs., Rs. 2,05,000.

**DIRECT BLUE 199:** To Keelung: Indokem Ltd., 500 Kgs., Rs. 68,321.

**DIRECT BLUE BLACK BT:** To Keelung: Kantilal Sanghvi & Co., 1,000 Kgs., Rs. 78,000.

**DIRECT GREEN B:** To Keelung: Vaha Chemicals Pvt. Ltd., 500 Kgs., Rs. 39,500.

**DIRECT VIOLET 9:** To New York: Golden Dyes Corp., 1,000 Kgs., Rs. 2,63,000.

**DYE INTERMEDIATES:** To Barcelona: Atul Products, 19,815 Kgs., Rs. 9,14,977; To Antwerp: Vison

Intermediates, 14,438 Kgs., Rs. 13,18,707; Atul Products, 14,440 Kgs., Rs. 6,49,766; To Hamburg: Rang Udhyog, 5,917 Kgs., Rs. 7,34,468; Mangalya Trading & Investments, 532 Kgs., Rs. 5,77,000; To Odessa: Amar Dye Chem, 8,250 Kgs., Rs. 9,57,000; To Rotterdam: Sandoz (I) Ltd., 900 Kgs., Rs. 1,02,639; To Istanbul: Sajjan Impex Pvt. Ltd., 15,350 Kgs., Rs. 12,28,818; Sajjan Impex Pvt. Ltd., 22,200 Kgs., Rs. 10,52,292; Gokul Enterprise, 41,440 Kgs., Rs. 31,18,383; To Barcelona: Priya Elec. & Chemicals, 6,288 Kgs., Rs. 7,62,722; To Chittagong: Amritlal Chemaux Ltd., 300 Kgs., Rs. 21,853; To Bangkok: Orchem Industries, 2,000 Kgs., Rs. 2,61,891; To New York: Vivid Exports, 5,350 Kgs., Rs. 4,25,197; Vapi Product Industries, 5,500 Kgs., Rs. 6,67,340; To Busan: Priya Chemicals, 2,200 Kgs., Rs. 2,70,612; To New York: Vapi Product Industries, 5,500 Kgs., Rs. 6,67,340; Zenith Limited, 13,450 Kgs., Rs. 10,75,615; Sagar Drugs & Pharms, 18,200 Kgs.,; To Keelung: Jay Chemical Inds., 5,000 Kgs., Rs. 2,60,000; To Busan: Mangalya Trading & Investments, 2,000 Kgs., Rs. 1,58,000; To New York: Jindal Dye Intermediate, 18,181 Kgs., Rs. 1,49,74,148; Vapu Product Industries, 3,950 Kgs., Rs. 1,08,638; To Hong Kong: Brinda Export Agencies, 2,000 Kgs., Rs. 40,880.

**DYES:** To New York: Atic Industries Ltd., 506.64 Kgs., Rs. 4,68,085; Atic Inds. Ltd., 1,536 Kgs., Rs. 9,44,043; To Boston: IDI, 500 Kgs., Rs. 1,21,000; Karsandas Mavji, 2,000 Kgs., Rs. 1,80,629; To Busan: Kantilal Sanghvi, 500 Kgs., Rs. 30,000; Indokem Limited, 1,750 Kgs., Rs. 1,63,191; Priya Electronics & Chem, 1,000 Kgs., Rs. 1,86,234; Bhavi Imp. Export, 500 Kgs., Rs. 57,872; Bhavi Imp. & Export Ltd., 500 Kgs., Rs. 44,255; Indokem Ltd., 500 Kgs., Rs. 57,872; Bhavi Imp. & Export Limited, 500 Kgs., Rs. 44,255; Indokem Limited, 500 Kgs., Rs. 52,936; To Chicago: Ravi Chem dye, 6,000 Kgs., Rs. 6,92,143.

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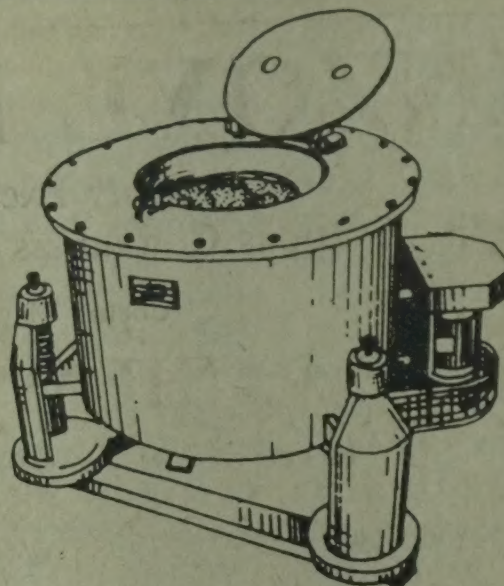
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